THE FOUNDRY

Volume 53
Number 19

CLEVELAND, OHIO, OCT. 1, 1925

Published
Semimonthly

Castings Ease Woman's Work in Domestic Service

HOUSEKEEPING has lost many of its distasteful features through the introduction of various electrical appliances, perhaps the greatest help to woman coming through the perfection of the washing machine. It has taken over 30

Several Makers Advertise the Cast Features of the Machines

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Find Where Castings Can Be Sold

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Salt-Hospitality's Token

Basis of

Convention City's Industrial Growth

Syracuse Celebrated in June, 1925, the Centennial of Its Establishment as a Village

THIS is the first occasion on which the American Foundrymen's association has selected the city of Syracuse, N. Y., for its annual convention and for the allied exhibition of foundry equipment and supplies, but it is not the first occasion on which Syracuse has extended its hospitality as a convention city or a gathering place where men have met to discuss questions of local and national importance. Shortly before and even after the coming of the white man the chiefs of the powerful Six Nations met here to hold council in the Long House. Here Hiawatha in the plenitude of years took his departure in his white canoe to the land of the hereafter after welding the warring factions of the loosely bound organization into a compact federation.

English and French with covetous eyes on the bountifully endowed territory, came here on many occasions, sometimes in war and sometimes in peace, but ever with the predominant thought of adding this fair and attractive land to the list of colonies which already had sworn allegiance to their respective sovereigns. Each claimed it in turn and held it for brief periods but eventually, it was secured by those who logically had the best right to it, the men who had settled the country and who got rid of all outside interference and set up government for themselves.

Men came here under many conditions, from different directions and either on foot or by canoe; hunters, trappers, courier-du-bois, soldiers under the flaunting red banner of England, soldiers under the lillies of France and black robed missionaries holding aloft the emblem of the lowly Nazarene. Attempts to Christianize the Iroquois met with little and that little doubtful success. Expediency moved some of the aborigines to embrace the strange faith of the white man, but it was little to their liking and even to the present day the few remaining members of the once powerful Six Nations still cling to the conceptions of the here and the hereafter that were current before the aliens from a foreign land came over the great salt water in the high ships that were moved by the wind.

Truly the life of the adventurous white men who penetrated the interior was a constant succession of excursions and alarms, of battle, murder and sudden death. War parties of the Iroquois roamed far and wide from the shores of Lake Ontario to Connecticut and their pealing war cry served both for prelude and a requiem for the unfortunate victims ushered into eternity.

Peaceful gatherings in Syracuse in recent years offer marked contrast to the scenes of torture and carnage enacted on the same site when returning war parties of the Onondagas dragged their captives to the center of the village and after subjecting them to the most cruel tortures in which they exhibited a fiendish originality, sent them to the happy hunting grounds.

It seems like a curious working out of the universal law of compensation that one of these same missionaries who braved black death in the wilderness in fulfillment of a vow to win the heathen to his form of belief should be the first to discover and exploit the salt springs on which Syracuse later should rise to greatness as a commercial and manufacturing city. He sampled some of the water which the Indians believed poisoned by an evil spirit and which on that account they refused to touch. To him with a European training it was merely brine which he proceeded to evaporate. A bag of the resulting salt was taken to Montreal, the first of many shipments that eventually totaled millions of bushels shipped all over America and to foreign lands.

At one time Sir William Johnson, the only white man who ever gained sufficient control over the tribes to have his word accepted as law in every smoky camp and by every fleet footed forest runner between the Hudson and the lakes, seemed in a fair way to control the salt springs. As a partial recognition of his services in winning the allegiance of the Indians, his majesty, George III, was graciously pleased to confer on him a grant of land 2 miles wide all around Onondaga lake. Unfortunately—for Sir William—the

American colonists some time later decided to sever relations with England and the claim was invalidated.

Not until the early years of the nineteenth century did enterprising men begin to visualize the commercial possibilities of the salt springs. After the Indians had been shown by the Jesuits how to extract salt from the evil smelling waters which they formerly believed welled up from the abode of a particularly wicked and malodorous demon, they eagerly adopted it is a condiment for their food and evaporated it by primitive means in small quantities. Visiting hunters and traders also took advantage of their proximity to the salt springs to boil down all they could in their kettles. Cut off for months from communication with civilized communities, salt was a treasure above rubies.

In time the commercial instinct began to assert itself and salt in gradually increasing quantities was shipped by canoe and on horseback to the markets of Montreal and Albany. The average person of today with a memory etxending back 20, 30, 40 or even 50 years, during all of which time salt was cheap and plentiful, will find difficulty in adjusting his mind to a realization that the first Syracuse salt sold in Montreal and Albany for its equivalent in weight of coined silver. A little later the unrefined product was sold in Albany for $6.50 a bushel. With greater production and better transportation facilities the price dropped rapidly. In 1825 salt sold for 60 cents a bushel and when the state of New York in 1908 sold all its remaining interest in the salt springs for $15,000 the price had dropped to 6 cents.

For more than 70 years salt was the great pivot around which the rapidly growing city of Syracuse revolved. Syracuse was known in popular designation as the salt city. For many years it was the only place on the North American continent where salt was manufactured commercially.

Sink Deep Wells

Originally the brine either was dipped by hand or pumped from the springs to the station where the water was evaporated. Later when the surface brine failed to collect in sufficient quantity to meet the demand, wells were bored to a depth of 1200 feet. The brine was pumped from these wells and delivered through hollow logs to the salt blocks or salt covers. These two terms were employed to distinguish between the two methods of evaporation. In the salt blocks the brine was treated in large iron kettles suspended in a row over a long furnace. In the salt covers the brine was reduced through solar evaporation. The advantage of the second system over the first was that it produced salt at a lower cost. Its disadvantage was that it was extremely slow and in addition an immense territory was required to produce a reasonable tonnage.

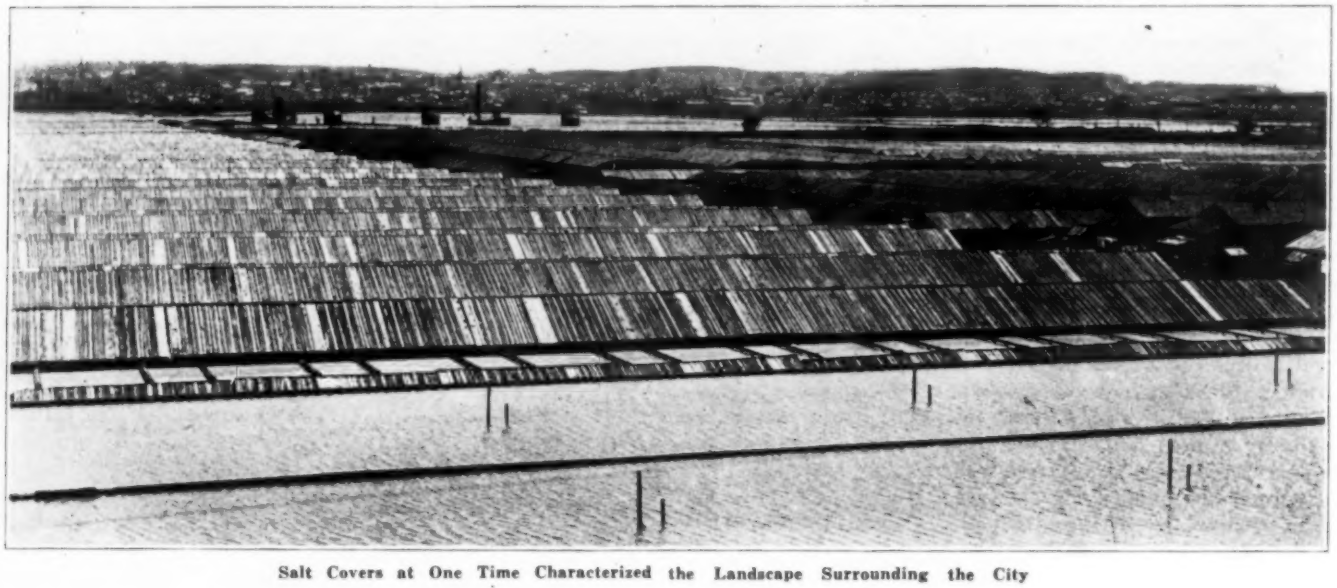
Through a gradual system of standardization 66 vats became adopted as the proper number to the acre. With over 100,000 vats in use for a period of years while the industry was at its peak it is claimed that the covers provided for unfavorable weather, extended to the limit of vision in all directions. From the reservation near Galeville on the east shore of the lake they spread around the head of the lake to the site of the present state fair grounds on the west. Great clouds of smoke poured by day and night from the tall chimneys of the salt blocks where 160,000 cords of wood were burned annually. The total yearly output of the fine salt made by boiling and the coarse secured as the result of solar evaporation, was 9,000,000 bushels. The production peak was reached in 1862. From that time the industry gradually declined owing to the discovery and exploitation of salt mines at Warsaw in Poland and in Michigan. The present production is at the rate of approximately 2,000,000 bushels per year.

Total production during the 105 years in which the state has controlled the leasing of the springs has been 382,087,711 bushels. At one time it was estimated that one-half the population of the city directly and indirectly found employment in connection with the salt industry.

Syracuse figuratively and literally is built on salt. Brine fairly drips from the early pages of its history and a saline flavor attaches to practically every event worthy of reference for the first 100 years. Nearly all the early individual fortunes came from salt.

Erie Canal Built

Weight of the Onondaga salt industry tipped the beam in favor of the construction of the Erie canal. For several years agitation had been growing in favor of opening a state waterway from the Hudson to the great lakes, but the necessary expenditure appeared prohibitive and it was not until the salt men of Syracuse pledged their revenues to secure the state's credit for the enterprise, that the necessary steps were taken to actually begin digging operation.



Salt Covers at One Time Characterized the Landscape Surrounding the City

Illuminating comment on the relative value of the dollar is found in the circumstances surrounding the original survey. An appropriation of $600 was secured from the state of New York and was placed at the disposal of James Geddes by the surveyor general of the state. The surveyor general apparently realized that $600 was not an inexhaustible amount and he cautioned James in the following list of instructions not to attempt a too ambitious program:

> As the provision made for the expenses of this business is not adequate to the effectual exploring of the country for this purpose, you will, in the first place examine what may appear to be the best route for a canal from Oneida lake to Lake Ontario, in the town of Mexico, and take a level and survey of it; also whether a canal route cannot be made between the Oneida lake and the Oswego, by a route in part to the west of the Oswego river, so as to avoid those parts along it where it will be impractical to make a good navigation. The next object will be the ground between Lake Erie and Ontario, which must be examined with a view to determine what will be the most eligible track for a canal from below Niagara Falls to Lake Erie. If your means will admit of it, it would be desirable to have a level taken throughout the entire distance between the lakes.

Wanted Full Value

Note that last touch. After giving the surveyor $600 to carry through a $6000 job, according to present standards, he suggests that he employ any surplus funds in running a level between two lakes nearly 30 miles apart. The surveyor general of that day was a thrifty soul and expected full value for his money.

James Geddes Who Surveyed the Erie Canal

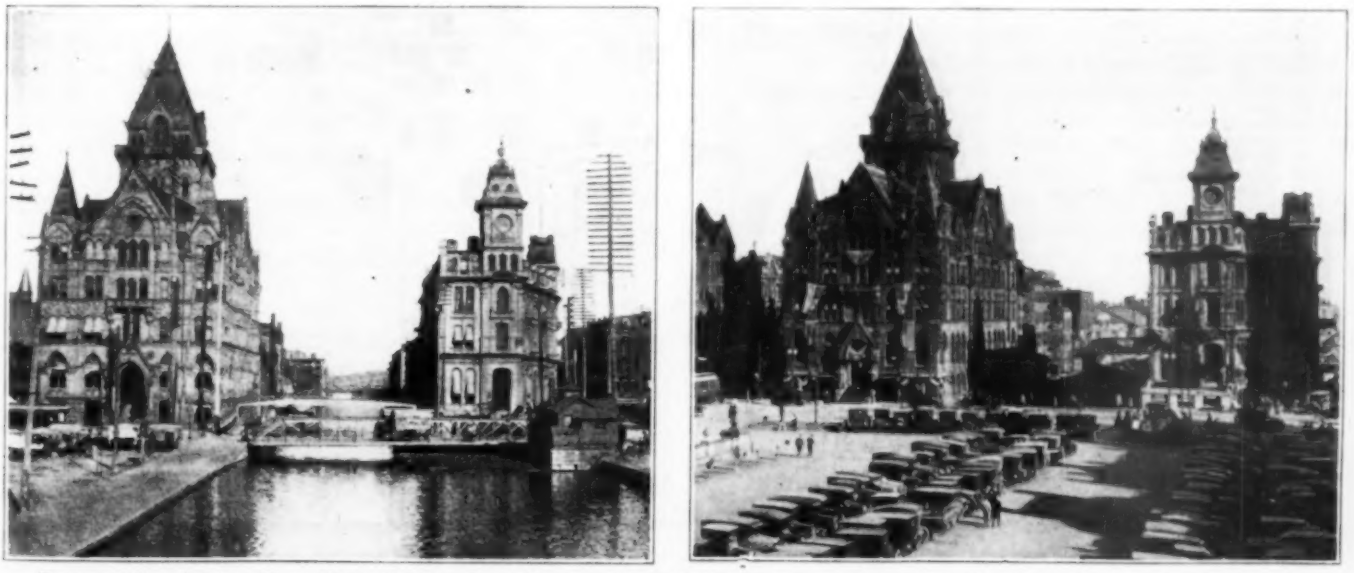
The most extraordinary feature of the entire transaction is that the actual expenses of the survey which occupied the greater part of three years only exceeded the appropriation by $75. The report rendered in 1809 showed the entire feasibility of the proposed canal project, but before the legislature had taken the necessary action, the war of 1812 side tracked every measure of a civil character. By 1816 pressure had been brought to bear on the legislature to provide for the survey of a canal route, this time on a more pretentious scale from the Hudson river to Lake Erie. James Geddes once more brought out the old level and in company with Benjamin Wright competently surveyed a line for the new slack water navigation route across the state.

Legislators, business men, salt men and surveyors long since have completed their work and left the scene of their earthy labors. The canal was built and for many years served the purpose for which it was intended. It too has passed after the manner of work fashioned by the hand of man. In the rural districts the former bed of the canal is covered with a luxuriant growth of vegetation and in many of the cities, including Syracuse the canal excavation has been filled to the prevailing street level and converted into a boulevard devoted principally to automobile traffic. Bridges, boats and burly packet men have disappeared and the once familiar colloquialism *Low Bridge*, meaning danger ahead, is as extinct as the passenger pigeon. One relic remains. The old spirit level one time property of James Geddes still is in existence as one of the treasures of the Onondaga historical association.

Accustomed to the slow progress of horse or canoe loaded to their limited capacity for journeys through the trackless forest or through intermittent water ways where portages were frequent and necessary, the prospect of journeying smoothly, safely and swiftly over a body of water capable of supporting boats of 70-ton burden, must have appeared at the time as little short of the millenium.

Speed Boats

Ground was broken at Rome, N. Y., on July 4 with appropriate ceremonies and by 1820 the middle section of the canal, 94 miles in length, had been completed. The first packet boat over the line passed through Syracuse on its way to Utica on April 21, 1820. The ancestor of the man who bestows names on Pullman cars, christened this boat the MONTEZUMA. He may have had in mind the first triumphal journey. Indeed it is doubtful if the famous Aztec monarch of old Mexico ever received the



Transportation Factors Have Changed Since the Erie Canal Was in Its Prime. Today a Crowded Street Covers the Canal Bed

ovation on any of his journeys accorded his nautical namesake by thousands of cheering men and women as it sped rapidly on its way.

Speed and more speed has appealed to mankind since the world began and since all speed records are based on a comparison with what has gone before it is easy to conceive of the excitement which prevailed among the crowd which thronged the bridges and streets in the vicinity of the canal. The MONTEZUMA came into Syracuse from the west at a moderate pace, but a spectacular finish was achieved, by lashing the horses to a dead run from the town limits to Clinton Square.

On October 29, 1825 the canal was opened officially for the entire length when a fleet of boats with a merry party headed by Governor DeWitt Clinton passed from Buffalo to New York. On the early packet boats the running time between Syracuse and Utica, 55 miles, was 24 hours, but the traveling was not continuous. The boats were tied up at night. Later, additional changes of horses were provided and the time was greatly reduced by keeping the boats in motion night and day.

Notable events in the later history of Syracuse include the great cholera epidemic which swept the town in 1832 and which was brought to the place by European immigrants traveling on canal boats to the new West. On August 20, 1841, 26 people were killed and hundreds were injured when 600 pounds of gun powder exploded in a burning building on the Oswego canal towpath. Jenny Lind, in 1851, with her charming personality and golden voice sang to a capacity audience with tickets at $2 and $4—and set a standard by which singers and other entertainers were measured during the lifetime of all who heard her. Charles Dickens gave a reading in the old Wieting hall in 1869 and stopped at the Syracuse house. In letters to friends in England he refers sourly and acridly to the hotel, the weather, and the inhabitants of the town. Apparently the only feature that met with his approval was the evening's receipts amounting to upward of 300 pounds.

The greatest advertising Syracuse ever received came in 1869 when the stone figure of the famous Cardiff giant was discovered near the bottom of a well. Apparently it either was a fossilized giant or an ancient statue of heroic size. News of the discovery rapidly spread not only in the vicinity, but throughout America and eventually the subject engaged the attention of scientists all over the world. The discoverer realized a fortune from

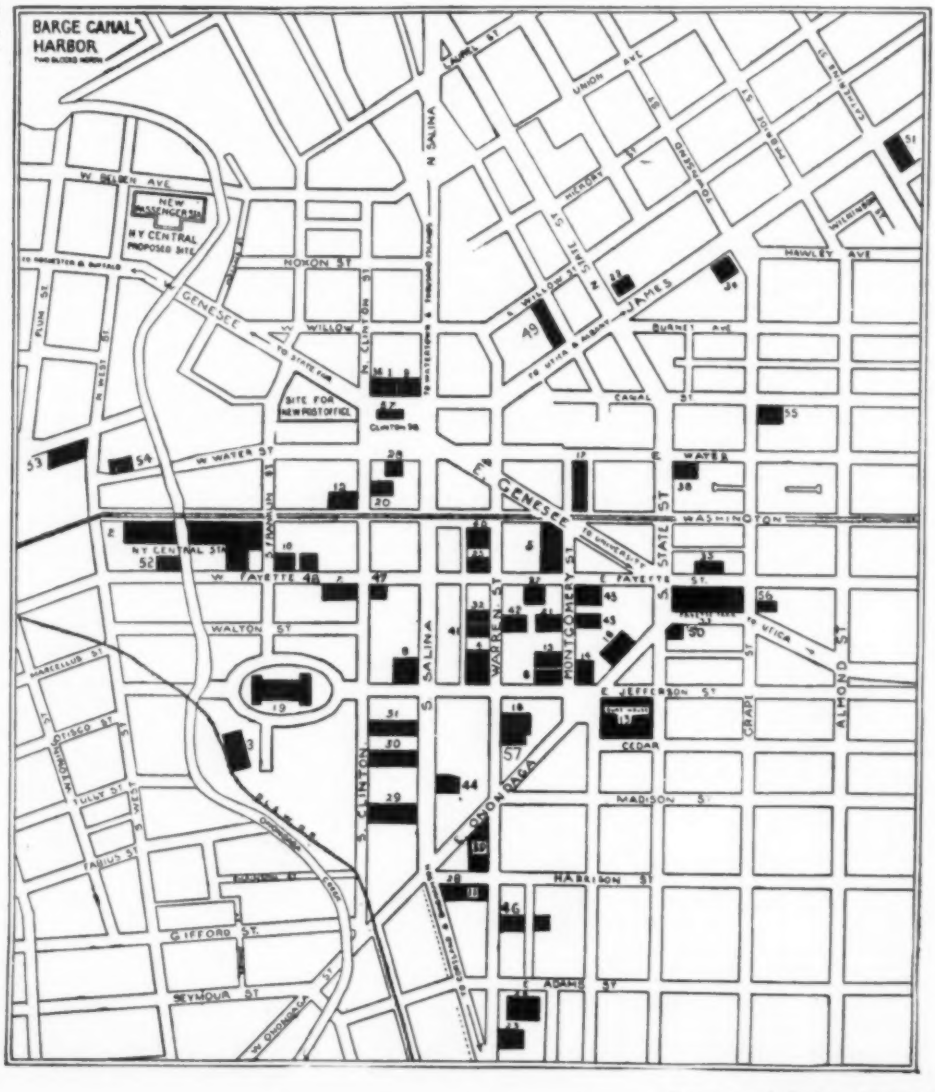
(*Concluded on Page 770*)

Civic Interest Centers in Downtown Syracuse

Showing location of hotels, theatres, railroad stations, clubs, garages, public buildings, convention halls, and other points of interest.

KEY

1 Electric Terminal
2 New York Central Station
3 D. L. & W. R. R. Station
4 Onondaga Hotel
5 Yates Hotel
6 Mizpah Inn
7 St. Cloud Hotel
8 Jefferson Hotel
9 Empire Hotel
10 Warner Hotel
11 Truax Hotel
12 Winchester Hotel
13 Court House
14 Public Library
15 Y. M. C. A.
16 Y. W. C. A.
17 City Hall
18 Syracuse Lighting Company
19 State Armory
20 Elks' Temple
21 Masonic Temple
22 Knights of Columbus Building
23 I. O. O. F. Lodge
24 Central High School
25 Postoffice
26 Strand Theatre
27 Robbins-Eckel Theatre
27 Fayette Trolley Station
28 Wieting Theatre
29 Empire Theatre
30 Temple Theatre
31 Keith's Theatre
32 Savoy Theatre
33 Fayette Park
34 Century Club
35 University Club
36 Educational Building
37 Soldiers' and Sailors' Monument
38 Bissell's Garage
39 Hotel Syracuse
40 University Block
41 Syracuse Herald
42 Post-Standard
43 Journal
44 Crescent Theatre
45 Onondaga Historical Society
46 Syracuse Garage and Annex
47 Kirk (Stag Hotel)
48 Eagles' Club
49 Alhambra Building
50 Syracuse Telegram & American
51 Schopfer Court
52 Great Northern Warehouse
53 Syracuse Cold Storage Co.
54 King Storage Warehouse
55 Flagg Storage Warehouse
56 Kanatenah Club
57 Chamber of Commerce Building



Courtesy of Seeing Syracuse

Convention City Products Show Diversified Industries

World-Wide Reputation Attained by Commodities Manufactured in Syracuse—Local Foundries Offer Interesting Features

FROM the latter part of the nineteenth century until today, Syracuse, N. Y., the scene of the 1925 convention and exhibition of the American Foundrymen's association, has enjoyed a steady and healthy industrial growth. The city early became known nationally for its leadership in the production of one commodity, namely salt. Naturally, the needs of that industry governed the type of small manufacturing establishments founded in the early history of the settlement. The growing demand for salt kettles and the saving in time and expense that resulted in making them close at hand rather than in the plants farther east, led to the establishment of the Alexander, Bradley Dunning foundry in 1828, while in 1829 the Avery & Lyon Works was built on a site later occupied by a weigh lock of the Erie canal to do iron founding and machine work.

Other companies organized before the Civil war include the Pierce, Butler and Pierce Mfg. Co., which was founded in 1849 to make steam heating apparatus and now has a number of plants throughout the country with a large foundry at Syracuse. Another firm which originated in the early days was Frazier & Burns, founded in 1852 to make saddlery, hardware, leather goods and iron castings, and which later became the firm of Frazer & Jones, which now operates a large malleable foundry.

The latter part of the century witnessed the establishment of many new industries in the city, many companies which are flourishing today being founded in that period. These include the E. C. Stearns Co., which was organized in 1860 to manufacture door hangers, locks, window screens, etc., and which later made bicycles; the Syracuse Chilled Plow Co., in 1876, which became one of the leading manufacturers of chilled plows of all kinds; the Straight Line Engine Co., in 1880, which made an engine and now operates a large jobbing foundry; the M. L. Oberdorfer Brass Co., in 1879; the Merrell & Soule Co., in 1869 and L. C. Smith & Bros. Inc., in 1881.

The city attracted national attention in the late nineties when the craze for bicycle riding followed the development of the pneumatic tire. No less than five large establishments for manufacturing bicycles sprang up in Syracuse, from which thousands of bicycles were shipped daily to all parts of the civilized world. This type of locomotion was popular for a few years and then the public interest died almost as suddenly as it came and the factories were diverted to other uses.

The first company to manufacture typewriters in the city was organized in 1893, and soon Syracuse became known as the Typewriter City, with three large plants turning out more typewriters than any city in the world. The city today does a notable business in the manufacture of writing machines, the plants of L. C. Smith & Bros. Inc., which is owned by Ford, Bacon & Davis, New York; Smith, Premier Works and the Remington Typewriter Co., being located there.

Syracuse long has been identified with a washing machine manufacture. In 1876, the Laundry Queen was patented and manufacture was started in 1882. This machine consisted of a rig which was attached to the side of the tub and was worked up and down by hand. One of the leading machines on the market today is made in the city, two companies being engaged in this work, the Syracuse Washing Machine Corp., manufacturing a motor driven machine, and the Burlingame Mfg. Co., making one operated by hand.

Part of the industrial growth of the city may be attributed to its geographical location and to the transportation facilities available. The city is located about midway between Buffalo and Albany in the rich agricultural section of New York state. It is considered a sizeable railroad center, the roads entering the city as the spokes of a wheel enter the hub. Further, it is situated on the New York state barge canal, having a modern equipped harbor with facilities for quick and economical handling of bulk and package freight.

The industries of the city now are widely diversified, and the products of its factories find markets throughout the world. Syracuse is the leading city in the United States in the manufacture of automobile differentials and transmission gears, and is noted for the production of tool steel, agricultural implements, fine candles, soda ash and allied products, typewriters, shoes, china, pottery, mincemeat, powdered milk, automobiles, washing machines, clothes pressing machines, conveying equipment, foundry and machine shop products, etc.

Statistics from the United States department of interior show that in 1923 products valued at $149,144,581 were made in Syracuse in 467 plants. The value of products produced by industries in which metal is handled and manufactured by far exceeded any other line, being more than one-fourth of the value of products of all plants of the city. The automobile and allied industries produced the greatest value, namely $18,078,791, while the foundry and machine shop industry was second with products valued at $15,967,065.

Although Syracuse is not considered a large foundry center, the 30 odd shops in and around the city produce a great variety of work and offer many interesting features. Several shops still are pouring metal in the same buildings which were erected when they first were organized 30 or 40 years ago, but now modern equipment is being used.

The majority of plants are engaged in the production of jobbing castings, the variety of other factories in the city offering a market for this type of work. In this class the Straight Line Engine Co., probably presents a number of interesting features. The company makes castings ranging in size from a few pounds to 25 tons in

green sand, dry sand and loam molds. The company has been carrying on some interesting experimental work in connection with the production of cylinders for air cooled gasoline engines.

The E. C. Stearns Co., while engaged in the manufacture of hardware for its own factory, also does considerable jobbing work. This consists partly of typewriter bases for the factories in the city and vicinity, and washing machine parts. The Globe Malleable Iron & Steel Co., is manufacturing gray iron castings only, having discontinued its malleable business.

Syracuse is one of the few towns in the country which boasts of a foundry run by a woman. The Reddin Iron Works, which makes jobbing work in gray iron, is managed by its owner, Mrs. A. S. Reddin. Mrs. Reddin assumed charge of the plant upon the death of Mr. Reddin 23 years ago, and since has conducted the business in an efficient and profitable manner.

Several plants are producing jobbing castings in nonferrous metals, some large and complicated work being poured by several companies. Among the firms engaged in this work are included E. R. Caldwell & Son, Caldwell & Ward Brass Co., and the M. L. Oberdorfer Brass Co., the latter being located in East Syracuse.

The Frazer & Jones Co., which makes automobile, railroad and agricultural malleable castings, has a large modern foundry in Solvay, a suburb. This company has installed a powdered coal system for firing the furnaces and one core oven. The Syracuse Malleable Iron Works, which was founded in 1882, and at one time was considered one of the larger plants of the country, now is controlled by the Smith Wheel Co. The latter company makes cast wheels for trucks and recently has entered the field of manufacturing cast wheels for passenger cars.

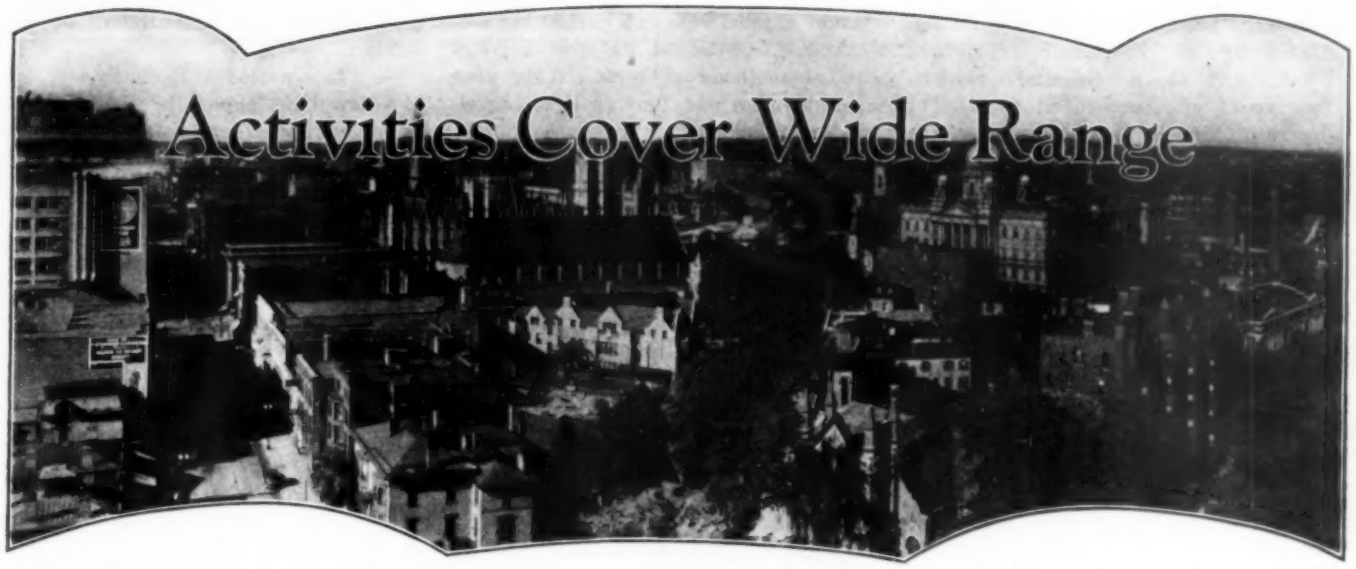
The foundry of the Syracuse Chilled Plow Co. is located on the third floor of the plant, the raw materials being carried to this level on a high speed elevator. Plow and implement parts are made in this plant on a production basis, one molder being able to put up approximately 240 molds per day on a hand squeeze machine. Several years ago this foundry was scattered over twice the territory it now occupies producing practically the same tonnage. The necessity for economy in overhead costs resulted in a study of stacking methods, and a resultant saving in floor space. Now each molder piles his molds in two rows and pours from a ladle suspended from a track running down the center of the two piles.

Representative Foundries in the Convention City

Location, Personnel and Capacity Casting Plants in Syracuse and Vicinity

Name	Address	Established	Metal melted	Class of Casting	Output Daily Tons	Melting Units	Men Employed	President or General Manager
Caldwell & Son, E. R.	619 W. Fayette Street	1914	Brass, bronze & alum.	Light Jobbing	4	1 electric, 3 coke furnaces	24	R. L. Caldwell
Caldwell & Ward Brass Co.	120 Burnet Street	1897	Brass, bronze & alum.	Jobbing and patterns	3	7 oil furnaces	60	L. F. Meagley
Carhart Bros. Foundry	1618 North Salina	1920	Gray iron	Jobbing and Machinery	7	1 cupola	35	H. A. Carhart
Crouse-Hinds Co.	Wolf and Seventh Streets	1897	Gray iron, brass & aluminum	Special	30	1 cupola, 5 pit, 1 tilting furnaces	271	H. B. Crouse
Crouse & Pope Foundry Corp.	Auburn, N. Y.	1923	Gray iron	Jobbing	100	3 cupolas	150	W. J. Henry
Dunning & Boschert Press Co., Inc.	329 West Water Street	1872	Gray iron	Jobbing and specialty	7	1 cupola	50	R. F. Boschert
Edwards Co., Inc., O. M.	Solar & Plum Streets	1902	Brass	Hardware	1	2 oil furnaces	12	O. M. Edwards
Empire Foundry Co.	203 Temple Street	1908	Gray iron	Jobbing	9	1 cupola	60	Grant D. Green
Engelberg Huller Co.	831 W. Fayette Street	1888	Gray iron & white iron	Machinery	3	1 cupola, 3 oil furnaces	14	J. R. Montague
Enterprise Foundry Co.	42-46 Washington St., Auburn	1904	Gray iron	Jobbing	10	2 cupolas	40	A. H. Nichols
Fay Foundry Corp.	139 Lakeview Avenue	1920	Gray iron	Machinery	12	1 cupola	52	James J. Fay
Franklin Die Castings Corp.	Magnolia & Gefford	1893	Lead, tin zinc & alum. base alloys	Die Castings			50	H. L. Franklin
Frazier & Jones Co.	Milton Avenue	1845	Malleable	Jobbing	50	3 powdered coal furnaces	400	Fred Frazer
Globe Malleable Iron & Steel Co.	101 Greenway Street	1907	Gray iron	Jobbing	50	2 cupolas	100	H. H. Elmer
McIntosh & Seymour Corp.	Auburn N. Y.	1886	Gray iron	Diesel engines	30	2 cupolas	125	A. E. Ballin
Morris Machine Works	Baldwinsville, N. Y.	1864	Gray iron & semi-steel	Machinery	8	1 cupola	50	Windsor Morris
Oberdorfer Brass Co., M. L.	Thompson Rd., East Syracuse	1881	Aluminum and brass	Jobbing	14	2 electric, 15 oil furnaces	300	Jonas Oberdorfer
Pierce, Butler & Pierce Mfg. Co.	Eastwood, N. Y.	1893	Gray iron and brass	Radiator and boiler	170	2 cupolas, 1 pit furnace	750	J. Lanz
Reddin Iron Works	406-18 Marcellus Street	1893	Gray iron	Jobbing	13	1 cupola	50	Mrs. A. S. Reddin
Salina Brass Foundry	132 Richmond	1924	Brass, alum., bronze and lead	Jobbing	1	3 pit furnaces	7	H. Thomas
Senk, J. & W.	1515 Lodi Street	1873	Brass, copper, alum., etc.	Jobbing		3 pit furnaces	4	J. W. Senk
Smith & Caffery Co.	2611 Lodi Street	1894	Gray iron	Jobbing	10	1 cupola	50	William B. Smith
Smith Wheel, Inc.	101 North Geddes Street	1916	Malleable	Wheels				D. L. Smith
Standard Brass & Alum. Fdy. Co., Inc.	1301 Center Street	1910	Aluminum and brass	Jobbing	½	4 pit furnaces	6	P. J. Sullivan
Stearns Co., E. C.	224 Oneida Street	1876	Gray iron	Hardware and light Jobbing	25	1 cupola	150	E. C. Stearns
Straight Line Engine Co.	218 South Geddes Street	1880	Gray iron	Jobbing	30	3 cupolas	275	W. H. Thomas
Syracuse Foundry Associates	950 Canal Street	1923	Gray iron	Jobbing	5	1 cupola	24	A. W. deCamp
Syracuse Malleable Iron Works	101 North Geddes	1883	Malleable	Jobbing				D. L. Smith
Syracuse Chilled Plow Co.	111 Wyoming Street	1876	Gray iron	Plow and implement parts	50	3 cupolas	120	W. W. Wiard
Swett Iron Works, A. L.	Medina, N. Y.	1873	Gray iron and brass	Jobbing	10	1 cupola	150	R. F. Swett
U. S. Hoffman Machinery Corp.	329 Temple Street	1910	Gray iron and alum.	Machinery	24	1 cupola	138	H. W. Stone

Activities Cover Wide Range



EACH successive convention of the American Foundrymen's association brings new evidence to support the fact that this organization is the greatest single force in the advancement of the foundry industry. Nor will the Syracuse convention to be held from Oct. 5 to 9 offer any exception. An unusual program of varied interest, embracing more than forty papers has been prepared and scheduled for sessions which promise the interested visitor an opportunity to choose that line of study in which he is directly interested.

Seventeen separate sessions, including those to be held jointly with the Institute of Metals division of the A. I. M. E. will give opportunity for the leaders in scientific thought and practical experience to present their views. In addition to the papers by American authors of high standing, the French and British foundry associations have sent exchange papers under an agreement suggested by the American Foundrymen's association several years ago.

The live questions of metallurgy, the effect of heat treatment, apprentice training, malleable, steel, nonferrous and gray iron foundry practice, refractories, costs, sand and methods of testing, the topics of some of the discussions, furnish an indication of the range to be covered in the various sessions of the convention. In addition the important investigational and research work being carried on at the direction of the association will be presented through the reports of committees.

On the pages accompanying will be found a condensed program or time table of activities and in addition the complete technical program.

In addition to these scheduled events, full time will be allotted to the visitors to inspect an annual exhibition of foundry equipment, machinery and supplies, in halls adjacent to the meeting rooms. Further, with the cooperation of the local committees of Syracuse, entertainment features have been provided, and plant inspection trips have been planned. Special attention has been given to providing for the pleasure of visiting ladies. On Tuesday, motor coaches will be furnished to take the ladies to Skaneateles lake, one of the most beautiful scenic trips to be found in America. Luncheon will be served before the return trip.

A dinner has been arranged for Tuesday evening by the Institute of Metals division to which all interested in nonferrous metals are invited.

On Wednesday a second trip to Cazenovia lake, another wonder spot of northern New York is planned for the ladies. This lake, surrounded by wooded hills and rich estates, is the site of Shore Acres, a mansion designed by Sanford White. Luncheon will be served at this point.

Returning to Syracuse that evening, a reception and dance will be tendered at the Hotel Onondaga. Thursday has been set aside for a luncheon bridge party for the ladies at Schraffts, located on Warren street between the Syracuse and Onondaga hotels. That afternoon also will be made memorable by a ball game between rival teams selected from among the foundrymen and the supply and equipment representatives.

Thursday night will be devoted to the annual subscription banquet of the American Foundrymen's association at the Syracuse hotel, to be followed by a reception and dance at which the visitors will be the guests of the local committee. Provision has been made for visitors to enjoy the local golf clubs, and guest cards will be provided at the booth of the Syracuse committee. Plant visitations may be scheduled for all those desiring to visit the many interesting manufacturing plants of Syracuse.

Schedule of Events

Monday, October 5

10:00 a. m.—Opening of registration and exhibits at State Fair grounds.
2:00 p. m.—Nonferrous and gray iron technical sessions.

Tuesday, October 6

10:00 a. m.—General and aluminum and aluminum alloys technical sessions.
11:00 a. m.—Ladies leave Hotel Syracuse for country drive.
12:15 p. m.—Luncheon and round table discussion on brass founding problems.
1:30 p. m.—Foundry costs technical session.
3:00 p. m.—Apprentice training and foundry refractories technical sessions.
6:30 p. m.—Annual dinner, Institute of Metals division, A. I. M. E.

Wednesday, October 7

10:00 a. m.—Steel foundry practice technical session.
10:00 a. m.—Meeting of Institute of Metals Division, A. I. M. E.
10:00 a. m.—General papers and committee reports.
11:00 a. m.—Ladies leave Hotel Onondaga for trip to Cazenovia lake.
1:00 p. m.—Group picture of association members and guests will be taken.
1:30 p. m. Business session.
2:30 p. m.—Technical session on sand.
8:00 p. m.—Dance, card and entertainment party, mezzanine floor, Hotel Onondaga.

Thursday, October 8

10:00 a. m.—Technical sessions on metallurgy of cast iron and malleable cast iron.
1:30 a. m.—Ladies luncheon at Schraffts.
2:00 p. m. Technical session on sand research.
6:30 p. m.—Annual subscription banquet, Hotel Syracuse. A reception and dance will follow the banquet.

Friday, October 9

10:00 a. m.—Technical session on gray iron practice.

Gray Iron Looms Large

Several exceedingly important papers on the metallurgy of cast iron have been prepared for presentation at various sessions. Synthetic cast iron, ever an intriguing subject to the foundryman whose shop is remote from the blast furnace and adjacent

to a large supply of scrap, will be discussed by G. E. Lamb, Hoquiam, Wash., and G. S. Schaller, Seattle. Two years of practical production of electric furnace iron furnishes the background for this paper. Alternate steel heats also were made, thus serving to answer a question often heard in discussions of electric furnace practice.

Heat treatment of cast iron and semisteel promises to engage much attention, while the effect of different alloy additions upon strength, deflection, machinability, shrinkage and hardness of cast iron will be discussed.

ciation a joint research committee was organized, which as its first activity studied methods of tests. This year several important lines will be developed ranging from the source of desirable molding sands, through the subjects of testing and a consideration of the life of molding and core sands, proper mixtures and as a related subject, the methods of comparing bonding properties of various oils and compounds.

The cost committee of the association has prepared a novel meeting for all foundry managers and more particularly those interested in gray-iron

mold casting methods all will be considered.

International Exchanges

Noteworthy papers by metallurgists of international renown will be offered on behalf of the European foundrymen's associations. That of the Institute of British Foundrymen will be contributed by J. E. Fletcher, British Cast Iron Research association and will cover the inter-relation which exists between cast iron, wrought iron and steel practice. The Association Technique de Fonderie de France, will be represented by a paper dealing with foundry practice as relates to

Clinton Square and the Soldiers' and Sailors' Monument Mark Historic Center of the City

The effect of oxygen upon iron promises to be a subject open to debate. Further investigations by W. E. Jominy, University of Michigan, since he presented a paper at the A. F. A. Milwaukee convention last year will be offered. J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, will present for consideration the results of some extensive and thorough studies of the effect of phosphorus in cast iron.

One of the most unusual lines of investigation of cast iron foundry practice is that which will be described in a paper by H. W. Dietert and W. M. Myler, U. S. Radiator Corp., Detroit. After trying various methods of measuring the temperature of iron at the cupola spout, the foundries of this company have developed a heat control method, recording the temperatures of the gases above the stream of iron emerging from the spout. The methods of observation and control will be explained in this paper.

Sand came into prominence several years ago and through the activity of the American Foundrymen's association

foundries. An estimating contest has been arranged. Blue prints of castings will be displayed in one of the booths assigned to the cost committee. From these foundrymen will be asked to estimate the weights of the castings, a prize having been provided to the one guessing nearest to the correct poundage. Further sample castings carrying the estimated cost of production will be shown.

Practical nonferrous subjects will be discussed at a number of sessions arranged to be held jointly by the foundrymen's association and the institute of metals division. Melting methods, temperature control, handling problems and properties of nonferrous metals give an idea of the range of subjects offered at these sessions. A separate session will be devoted to aluminum. The growing importance of alloys of this metal due to the demands from manufacturers of aircraft is emphasized by a number of the lines of study presented at this session. Mechanical properties of aluminum-copper-silicon and other light alloys, the X-ray method of locating hidden defects and permanent

light alloys, by R. deFleury, Paris, and one on the study of graphitization by Albert Portevin and Pierre Chevanard, Paris.

Salt Hospitality's Token Basis of Growth

(*Concluded from Page* 766)

exhibition fees before the hoax was exposed. The perpertrator had conceived the idea of carving the figure from a huge block of gypsum rock, staining it with acid, burying it in the ground and then discovering it a year later when it had properly aged.

Prestige of Syracuse as a manufacturing center increased in 1890 when the state fair was located permanently in the city. The state acquired title to the fair grounds and in 1900 the governor signed the order placing the management in the hands of a state commission. A beginning was made at that time on the erection of the set of permanent buildings in which the American Foundrymen's association is holding its convention and exhibition this year.

Tentative Program of Technical Papers

Monday, October 5

Nonferrous—Joint Session with Institute of Metals Division A. I. M. E.

Afternoon—Some Refractory Problems in the Nonferrous Electric Furnace Casting Shop, by G. F. Hughes, Bridgeport, Brass Co., Bridgeport, Conn.
Temperature Control of Nonferrous Alloys, by R. L. Binney, the Bunting Brass & Bronze Co., Toledo, O.
Atomized Coal System of Nonferrous Melting, by R. Black and C. L. Shafer, Gibraltar Bronze Co., Cincinnati.
Material Handling in a Brass Foundry, by T. C. Flinn, Blake & Knowles Works, Worthington Pump & Machinery Corp., East Cambridge, Mass.

Gray Iron Session

Afternoon—Continuous Iron Temperature Recorder on the Cupola Spout, by W. H. Dietert and W. M. Myler, the U. S. Radiator Corp., Detroit.
The Effect of Heat Treatment on the Properties and Microstructure of Gray Cast Iron and Semisteel, by O. W. Potter, University of Minnesota, Minneapolis. Presented in behalf of the Twin City Foundrymen's association.
Electric Melting of Cast Iron, by G. E. Lamb, the Lamb Machine Co., Hoquiam, Wash.
Synthetic Cast Iron, by G. S. Schaller, University of Washington, Seattle.

Tuesday, October 6

General Session

Morning—Reducing Costs of Cleaning Ferrous Castings, by J. H. Hopp, Hopp-Patterson Co., Chicago. Contributed on behalf of the Chicago Foundrymen's association.
Some Inter-relationships in Cast Iron, Wrought Iron and Steel Practice, by J. E. Fletcher, British Cast Iron Research association. Annual exchange paper of the Institute of British Foundrymen.
Foundry Progress, Past, Present and Future, by J. D. Towne, Dayton Steel Casting Co., Dayton, O.

Aluminum and Aluminum Alloys—Joint Meeting with the Institute of Metals Division of the A. I. M. E.

Morning—Aluminum and Aluminum Alloys in Aircraft, by Samuel Daniels, engineering division, air service, United States army, McCook field, Dayton, O.
X-Ray Examination of Aluminum Alloy Castings for Internal Defects, by R. J. Anderson, Cleveland.
Aluminum Alloy Permanent Mold Castings, by J. B. Chaffe, Jr., Permold Co., Cleveland.
Mechanical Properties of the Aluminum-Copper-Silicon Alloy as Sand Cast and as Heat Treated, by Samuel Daniels and D. M. Waner, McCook field, Dayton, O.
Some Notes on the Founding of Light Alloys, by R. deFleury, Paris, France, presented on behalf of the Association Technique de Fonderie de France, as the annual exchange paper.

Foundry Costs

Afternoon—Discussion of Foundry Cost Accounting.

Apprentice Training Methods

Afternoon—Discussion of questions and experiences pertaining to apprentice training in foundries.

Foundry Refractories

Afternoon—Discussion of questions pertaining to problems of foundry refractories in the steel, malleable and gray iron foundry.

Wednesday, October 7

Steel Foundry Practice

Morning—Making Miscellaneous Castings for Navy Use, by Lieut. Commander D. F. Ducey, U. S. navy yard, Puget Sound, Wash.
Carbon Steel and Carbon-Vanadium Steel in the Converter, by S. R. Robinson, Industrial Works, Bay City, Mich.
Low Cost in Electric Furnace Melting, by A. W. Gregg and N. R. Knox, Bucyrus Co., South Milwaukee, Wis.

Special Session of the Institute of Metals Division of the A. I. M. E.

Morning—Notes on the Fatigue of Nonferrous Metals, by H. F. Moore, University of Illinois, Urbana, Ill.
Endurance Properties of Nonferrous Metals, by D. J. McAdam Jr., U. S. naval engineering experiment station, Annapolis, Md.
The Annealing Cracking of Nickel-Silver, by E. O. Jones, and E. A. Whitehead, Manchester, England.
Special Nickel Brasses, by Oliver Smalley, New York.

General Papers and Committee Reports

Morning—Report of committee on corrosion.
Report of committee on pattern equipment standardization.
Safety in the Foundry, by R. G. Adair, supervisor of safety, the American Rolling Mill Co., Middletown, O. Contributed in behalf of the Ohio State Foundrymen's association.
Foundry Management, by J. W. Barrett, Metropolitan Life Insurance Co., New York.
Foundry Cost Accounting, by C. H. Scovell, Boston.

Business Session

Afternoon—Address of president.
Report of secretary-treasurer.
Report of resolutions committee.
Report of election of officers.

Sand Control in the Foundry

Afternoon—Report of chairman of joint committee of molding sand research.
Report of chairman of subcommittee on testing foundry sand.
Report of chairman of subcommittee on grading foundry sand.
Report of chairman of subcommittee on conservation and reclamation of foundry sands.
Some Examples of the Relation Between the Formation of Sand Deposits and Their Physical Character, by D. W. Trainer, geology department, Cornell university, Ithaca, N. Y.
Testing Apparatus, by T. S. Adams, Cornell university, Ithaca, N. Y.
A Novel Method of Tempering Sand, by Max Sklovsky, Deere & Co., Moline, Ill.

Thursday, October 8

Malleable Cast Iron Session

Morning—Wage Limitations, Group Bonus Plans, by B. R. Mayne, Saginaw Malleable Iron Co., Saginaw, Mich.
One of the Causes of Variation in Rates of Graphitization of White Cast Iron, by Anson Hayes and H. E. Flanders, Iowa State College, Ames, Iowa.
The Catalysis of Graphitization of White Cast Iron by the Use of Carbon Dioxide Mixtures When Applied Under Pressure, by A. Haynes and J. C. Scott, Iowa State college, Ames, Iowa.
A Consideration of the Annealing Operation in a Malleable Foundry, by C. J. McNamara and C. H. Lorig, the Stowell Co., Milwaukee.
Report of the committee on specifications for malleable castings.
The Effect of Some Modifications in a Rapid Annealing Method on the Physical Properties of Malleable Iron, by Anson Hayes, E. L. Henderson and G. R. Bessemer, Iowa State college, Ames, Iowa.
Chemical Elements Inhibiting Graphitization, by H. A. Schwartz, and G. M. Guiler, National Malleable & Steel Casting Co., Cleveland.

Metallurgy of Cast Iron

Morning—Nickel and Nickel Chromium in Cast Iron, by T. H. Wickenden and J. S. Vanick, International Nickel Co., Bayonne, N. J.
The Oxygen Content of Coke and Charcoal Cast Iron, by James R. Eckman and Louis Jordan, United States bureau of standards, Washington, and W. E. Jominy, University of Michigan, Ann Arbor, Mich.
Influence of Phosphorus on the Total Carbon Content of Gray Iron, by James T. MacKensie, the American Cast Iron Pipe Co., Birmingham, Ala.
Dilatometric Study of Graphitization, by Albert Portevin and Pierre Chevanard, Paris, France. Annual exchange paper, Association Technique de Fonderie de France.

Sand Research

Afternoon—Report of subcommittee on geological survey.
Practical Tests of Sand, by H. W. Dietert and W. M. Myler, U. S. Radiator Corp., Detroit.
The Life of Molding Sand, by C. M. Nevin, Cornell university, Ithaca, N. Y.
Testing Core Sand Mixtures, by A. A. Grubb, Ohio Brass Co., Mansfield, O.

Friday, October 9

Gray Iron Foundry Practice

Morning—Superheating Iron in the Cupola, by S. J. Felton, Ohio Mechanics institute, Cincinnati.
Effect Produced by Changing Size of Cupola Tuyeres, by J. Grennan, University of Michigan, Ann Arbor, Mich.
Quality of Core Oils, by H. L. Campbell, University of Michigan, Ann Arbor, Mich.
Desulphurization of Ferrous Metals, by G. A. Drysdale, Metal Improvement Co., Cleveland.

Promise Variety in Exhibits

Latest Developments Will Be Shown

Manufacturers and Liberal Arts Building

Dairy and Grange Buildings

PRODUCTION at low cost is a prime essential of these times of severe competition. Economy may be secured by watching all channels of expense and by employing the best mechanical aids in castings production. This year's exhibition of the American Foundrymen's association at Syracuse promises to excell previous shows in the variety of equipment for molding, pouring and cleaning castings, while the character of the miscellaneous supplies and small devices will be exceptional. Actual demonstrations of working equipment and models will serve to make plain the operation of practically all of the machinery shown. A. F. A. committees will occupy a number of the booths.

The exhibition will be divided and housed in two of the extensive buildings of the New York state fair grounds. The ground plans, booth numbers and other information necessary to locate specific exhibits will be found on the pages following:

A

ABRASIVE INDUSTRY, Cleveland—This booth will be fitted up as a rest room where those in attendance at the convention are invited to make their headquarters. The representatives will be J. F. Ahrens, G. B. Howarth and E. C. Kreutzberg.

ADAMS COMPANY, Dubuque, Iowa—This company will show jolt squeezer, jolt and stripping plate squeezer, pneumatic sand riddle, cherry snap flasks, steel jackets and other miscellaneous equipment. The exhibit will be in charge of W. J. Spensley.

ADVANCE MILLING CO., Chicago—Core binders and sample cores made from this binder will be shown by this company. D. T. McGrory will be the representative.

AIR REDUCTION SALES CO., New York—Oxygen and acetylene cylinders, welding and cutting apparatus and radiagraphs will be exhibited by this company. Demonstrations of hand welding and cutting torches will be given. Representatives will be H. K. Koerner, H. P. Lindholm and P. B. Cowell.

AJAX METAL CO., Philadelphia—Brass, bronze and other nonferrous alloys in ingot form will be exhibited. Brass melting and electric furnaces will also be on exhibition. The company will be represented by G. H. Clamer, W. J. Coane, F. M. Willeson, Zeno D. Barns, Henry Gieseke, William Adams, and Dudley Willcox.

ALBANY SAND & SUPPLY CO., Albany, N. Y.—Various grades of sand produced by this company will be on display. Exhibit will be in charge of Mr. Murray, Mr. Slater and Mr. Palmer.

ALLOYS & PRODUCTS, INC., New York—More than 150 alloys used in brass foundry practice will be on display at the booth of this company.

AMERICAN BRAKE SHOE & FOUNDRY CO., Chicago—This exhibit will consist of annealing boxes and will be in charge of C. P. Wright.

AMERICAN ENGINEERING COMPANY, Philadelphia—Foundry hoists of the plain trolley type, geared type, and motor driven type will be exhibited. Representatives will be A. E. Martell, George James, W. H. Vandergrift, H. Kempner and J. G. Worker.

AMERICAN FOUNDRY EQUIPMENT CO., New York—This company will exhibit sand blast equipment, core machines, aluminum, snap flasks, pattern mounting compound and sand cutting machines. The following representatives will be present: Verne E. Minich, Elmer A. Rich, James Rigby, Hutton H. Haley, John D. Alexander, Charles L. Benham, Frederick A. Smith, David Logan, and F. S. Weiner.

AMERICAN VENT WAX CO., Lockport, N. Y.—This company will exhibit various sizes of vent wax used for cores as well as numerous cores for which this wax is used. The representatives will be Nelson L. Nankey, and Charles J. Seibold.

AMES SHOVEL & TOOL COMPANY, Boston—Various types of molder shovels and scoops will be exhibited by this company. The representatives will be Joseph T. Hughes, Edwin T. Hipher and Walter H. Jenks.

ARCADE MFG. CO., Freeport, Ill.—Sand blast machines, pouring devices, powered jolt squeezers and hand squeezers, and other equipment such as flasks, jackets, and bands will be displayed. The representatives of this company will be L. L. Munn, Henry Tscherning, Mentor Wheat, V. S. Firestone, August Christen, R. E. Turnbull, G. D. Wolfley, and Herman Kasten.

ARMSTRONG-BLUM MFG. CO., Chicago—This company will exhibit high speed saws, band saws, and punching, shearing, bending machine. Harry J. Blum will be in charge.

ASBURY GRAPHITE MILLS, Asbury, N. J.—This company will exhibit a line of refined graphite and plumbago including foundry facings, graphite for paint, stove polish, electrical lines and lubricating purposes. Crude graphite for making crucibles also will be shown. The representatives will be H. M. Riddle, Sr., Jonathan Bartley, H. M. Riddle, Jr., Walter Field, and A. W. McKnight.

E. C. ATKINS & CO., Indianapolis—A line of metal cutting equipment consisting of metal cutting band saw machine, hack saw machine, circular saws of all kinds, hack saw blades and frames, will be shown by this company. The representatives will be E. S. Norvell, H. L. Pruner and W. L. Sturtevant.

AYERS MINERAL CO., Zanesville, Ohio—Molding sand for iron, brass and aluminum castings will be shown. Also a line of silica sands and silica wash for steel molding practice will be displayed. The company will be represented by E. M. Ayers, Russel G. Hay, J. A. Crew, George W. Jones, James S. Smith, and D. B. Davies.

AUSTIN CO., Cleveland—This company will exhibit photographs and models of foundry buildings, drawings of equipment and buildings, including layouts and typical construction details. Literature describing modern methods and tendencies of the construction of new and the rehabilitation of existing foundries will be distributed also. The representatives will be G. A. Bryant, H. E. Stitt, O. D. Conover, E. F. Scott, C. F. Chard and A. H. Meyer.

B

C. O. BARTLETT & SNOW CO., Cleveland—The exhibit of this company will consist of photographs of installations of sand handling and mechanical handling equipment in foundries. Representatives will be H. L. McKinnon, M. E. First, S. Gertz, and H. C. Orr.

H. L. BAUMGARDNER CORP., Chicago—Various types of cores made with the core oil manufactured by this company will be on display. A new snap flask made by the Hines Pattern & Mfg. Co., Cleveland, will be shown. The representatives will be J. F. Hines, F. W. Hamel, John Bybis Jr., Edgar Kierney, J. J. Baxter and H. L. Baumgardner.

BEARDSLEY & PIPER CO., Chicago—A tractor type sand throwing machine in operation will be exhibited by this company. Also a smaller portable type will be displayed. The representatives will be E. O. Beardsley, W. F.

Piper, G. Furman, E. L. Mitchell, H. G. Schlichter, John S. Sammons, E. O'Connor, C. H. Ellis, Harold Lind, and P. Stefan.

CHARLES H. BESLY & CO., Chicago—This company will exhibit a 53-inch wet, vertical spindle disk grinder and disk grinder with power actuated oscillating table. Both grinders will be motor driven. Abrasive disks, spirally shaped will be shown also. The company will be represented by E. P. Welles, C. A. Knill, E. L. Beisel, R. E. Beimer, J. F. Curns and A. J. Doermann.

BETHLEHEM STEEL CO., Bethlehem, Pa.—This company will exhibit some difficult castings made with the use of alloy pig iron containing nickel and chromium. The representatives will be G. A. Richardson, R. A. MacDonald, P. Kreulin, F. E. Fisher, A. D. Smith, T. G. Cox, J. M. Sylvester, F. Scholl, G. P. Scholly, M. M. Mitman, C. E. Lehr, E. L. Farabaugh, J. T. Mitchell, and F. C. T. Daniels.

BLYSTONE MANUFACTURING CO., Cambridge Springs, Pa.—Sand mixing and screening riddles will be exhibited by this company. The exhibit will be in charge of C. E. McKinney.

BRADLEY WASHFOUNTAIN CO., Milwaukee—Fountain fixtures for the foundry washroom will be displayed by this company. A. C. Cooper will be in charge of the exhibit.

BRIDGEPORT SAFETY EMERY WHEEL CO., Bridgeport, Conn.—This company will exhibit a swing frame grinder, motor driven, and alternating current motor driven floor grinder, steel casting chuck and a sectional grinding wheel. The representatives will be H. H. Fack, and I. L. Burritt.

BRITISH ALUMINUM CO. LTD. London, England—This company will exhibit regular and special grades of aluminum ingot. The exhibit will be in charge of Ernest V. Pannell and Arthur Jellinek.

C

CALIFORNIA WHITE & SUGAR PINE MFRS. ASSN., San Francisco—This company will exhibit a complete selection of pattern lumber.

CAMPBELL-HAUSFELD CO., Harrison, O.—Metal melting furnaces, tilting and stationary crucible and noncrucible which use either oil or gas for fuel will be displayed by this company. Motor blowers, oil feeder attachments, oil strainers and high temperature cement will also be shown. The company will be represented by J. E. Hausfeld, E. B. Hausfeld and J. S. Armour.

CARBORUNDUM CO., Niagara Falls, N. Y.—Grinding wheels for all foundry work, polishing grains, abrasive cloth for metal finishing and carborundum refractory products for foundry high temperature installations will be exhibited by this company. The representative will be W. W. Sanderson, C. E. Hawke, and S. A. Fenno.

CARTER BLOXONEND FLOORING CO., Kansas City, Mo.—Flooring panels manufactured by this company will constitute this exhibit. The representatives will be L. L. Bucklew, H. B. Louis and W. M. Rynerson.

FRANK D. CHASE, INC., Chicago—This exhibit will consist of photographs, plans, and layouts of modern foundries, both new and remodeled. Frank D. Chase, M. L. Pereira, and C. R. Cady will be in charge.

CHICAGO CRUCIBLE CO., Chicago—Graphite crucibles, stirrers, skimmers and other graphite products will be exhibited. Process for alloying gray iron in the cupola will also be shown with castings made of the alloyed iron. The representatives will be A. F. Hottinger, J. P. Foraker, W. MacFadden, H. C. Sorenson, D. H. Crosser, J. G. Crowe, J. W. Mann, and L. Knecht.

CHICAGO PNEUMATIC TOOL CO., New York—This company will exhibit an electrically driven compressor with direct connected motor. Pneumatic tools such as riveting hammers, air drills, grinders, hoists, bench and floor rammers also will be on display.

CHISHOLM & MOORE MFG. CO., Cleveland—This exhibit will consist of chain hoists and trolleys, electric hoists and overhead track for the same. In addition there will be a display of small model hoists on tables. The exhibit will be in charge of E. S. Ludlow.

CLARK TRUCTRACTOR CO., Buchanan, Mich.—Gasoline propelled industrial vehicles including an elevating platform truck, an end dump truck and a general utility tractor truck with crane attachment will be exhibited by this company.

CLEVELAND PNEUMATIC TOOL CO., Cleveland—This company will exhibit a complete line of foundry air tools consisting of sand rammers, chipping and sand hammers, core breakers, and portable grinders. A display of riveting hammers, caulking hammers, beading hammers, portable air drills, air hose, couplings and air valves will also be shown. The representatives of the company will be H. S. Covey, Arthur Scott, John DeMooy, J. T. Graves, J. A. Dockery, R. H. Rockefeller, and R. E. Manning.

CLIPPER BELT LACER CO., Grand Rapids, Mich.—Belt lacers, belt cutters, belt hooks and various sizes of connecting pins as well as an electrically operated moving belt display will be shown at this booth.

F. A. COLEMAN CO., Cleveland—This company will have an electric, rolling-drawer type core oven in operation. F. A. Coleman will represent the company.

COMBINED SUPPLY & EQUIPMENT CO., Buffalo—Chaplets for light, medium and heavy castings will be exhibited by this company. C. L. Jackson and S. LeViness, Jr., will be in charge of the exhibit.

CORN PRODUCTS REFINING CO., New York—This company will make cores demonstrating a core binder which it manufactures and will display cores for various kinds of work. The booth will be in charge of S. B. Krantz, Frank G. Faller, Jr., Horace D. Farris, Joseph M. Remmes, and Albert K. Kreischer.

D

DAVENPORT MACHINE & FOUNDRY CO., Davenport, Iowa—An assortment of castings which were made on a molding machine manufactured by this company will be shown. A number of photographs showing their equipment installed in numerous plants also will be shown. The representatives will be Robert Larkin, Carl Falk, A. D. Ziebarth and C. F. Scherer.

DAILY METAL TRADE, Cleveland—This booth will be fitted up as a rest room where those in attendance at the convention are invited to make their headquarters. The representatives will be Vincent Delport, S. H. Jasper and E. L. Shaner.

WM. DEMMLER & BROS., Kewanee, Ill.—This company will have a working exhibit of core machines and will be represented by H. L. Demmler and F. A. Demmler.

DETROIT ELECTRIC FURNACE CO., Detroit—This company will show a 350-pound electric furnace, together with a display of castings made by this type of furnace. The representatives of the company will be E. L. Crosby, A. E. Rhoads, L. B. Barker and F. P. Weaver.

DOCK & MILL CO., Tonawanda, N. Y.—This company will exhibit the different commercial grades of lumber suitable for pattern, flask and templet making. A soft textured white pine log showing how the sawing is done will be shown also. The following representatives will be present: Elmer J. Semon, J. D. Pierce and Walter M. Nantke.

HENRY DISSTON & SONS, INC., Philadelphia—This company will operate a saw machine cutting 4 and 6-inch rounds with a sectional interlocked, inserted tooth circular metal saw. A metal cutting hand saw machine will be used to demonstrate metal cutting band saws.

JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.—This exhibit will feature various graphite products used in the foundry.

E

ELWELL-PARKER ELECTRIC CO., Cleveland—This company will display electrically operated portable cranes, furnace chargers and elevator tractors. The representatives will be L. C. Brown, C. E. Cochrane, G. W. Brown, C. B. Cook, Ray Smith and W. C. Kershaw.

Syracuse and Central New York Foundrymen Join in Entertaining A.F.A.

Committee Chairmen

Finance, E. A. Hurdman, E. C. Stearns & Co.
Publicity, W. W. Wiard, Syracuse Chilled Plow Co.
Entertainment, J. L. Lonergan, Morris Machine Works.
Ladies Entertainment, Wm. Blackwood Smith, Smith & Caffery Co.
Golf, Martin W. Henley, Frazer & Jones Co.
Hotel, David C. Park, Smith & Caffery Co.
Transportation, G. A. Newman, Syracuse Chilled Plow Co.

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W. W. Cheney Jr., vice chairman, S. Cheney & Son, Manlius.
Harold B. Coyne, secretary, Reddin Iron Works, Syracuse.
R. E. Boschert, Dunning & Boschert Press Co., Syracuse.
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W. W. Cheney Sr., S. Cheney & Son, Manlius.
F. G. Chambers, Straight Line Engine Co., Syracuse.
H. H. Elmer, Globe Malleable Iron Works, Syracuse.
Fred Frazer, Frazer & Jones Co., Syracuse.
C. D. Green, Empire Foundry Co., Syracuse.
Martin W. Henley, Frazer & Jones Co., Syracuse.
E. A. Hurdman, E. C. Stearns & Co., Syracuse.
B. F. Lemke, Bausch & Lomb Optical Co., Rochester.
J. L. Lonergan, Morris Machine Co., Baldwinsville.
W. F. McCann, Utica Steam Engine & Boiler Works, Utica.
W. F. Merrill, Lamson Co., Syracuse.
J. R. Montague, Engelberg-Huller Co., Syracuse.
G. A. Newman, Syracuse Chilled Plow Co., Syracuse.
David C. Park, Smith & Caffery Co., Syracuse.
Wm. Blackwood Smith, Smith & Caffery Co., Syracuse.
E. C. Stearns, E. C. Stearns & Co., Syracuse.
W. H. Thomas, Straight Line Engine Co., Syracuse.
W. W. Wiard, Syracuse Chilled Plow Co., Syracuse.
L. P. Willsea, Willsea Works, Rochester.
H. M. Day, Syracuse Chamber of Commerce, Syracuse.

ELECTRIC FURNACE CO., Salem, O.—Electric heat treating and annealing furnaces with a number of photographs of installations of these furnaces will be exhibited by this company. Representatives of the company will be R. F. Benzinger, F. J. Peterson, O. J. Abell, Alexander Haigh, and R. D. Thomas.

F

FANNER MFG. O., Cleveland—This company will exhibit a line of foundry chaplets, tumbling mill stars and flask trimmings. The company will be represented by J. R. Raible, C. G. Raible, Pat McDonnell, John Rayburn, E. Durant, C. E. Ireland, and F. W. Beck.

FEDERAL FOUNDRY SUPPLY CO., Cleveland—This booth will be fitted up as a rest room to entertain visitors at the convention. The company will be represented by B. Permbaum, G. H. Donahue, Joseph Remmes and L. H. Heyl.

FEDERAL MALLEABLE CO., West Allis, Wis.—The various details in making molds on machines manufactured by this company will be demonstrated at the booth of this company.

FOWLER & UNION HORSE NAIL CO., Buffalo—Nails for foundry purposes will be displayed by this company. The exhibit will be in charge of Charles A. Reamer.

THE FOUNDRY, Cleveland—This booth will be fitted up as a rest room where those in attendance at the convention are invited to make their headquarters. The representatives will be D. M. Avey, Edwin Bremer, Pat Dwyer, G. B. Howarth, Frank G. Steinebach and Charles Vickers.

FOUNDRY EQUIPMENT CO., Cleveland—This company will exhibit various types of core ovens, core racks, etc. Photographs of installations of core ovens manufactured by this company will also be exhibited. Representatives will be C. A. Barnett, H. W. Steindorf, M. A. Beltaire, Jr., and C. M. Holcomb.

G

J. H. GAUTIER & CO., Jersey City, N. J.—This company will exhibit various sizes of graphite crucibles, glazed pots, graphite refractory materials, and insulation material in

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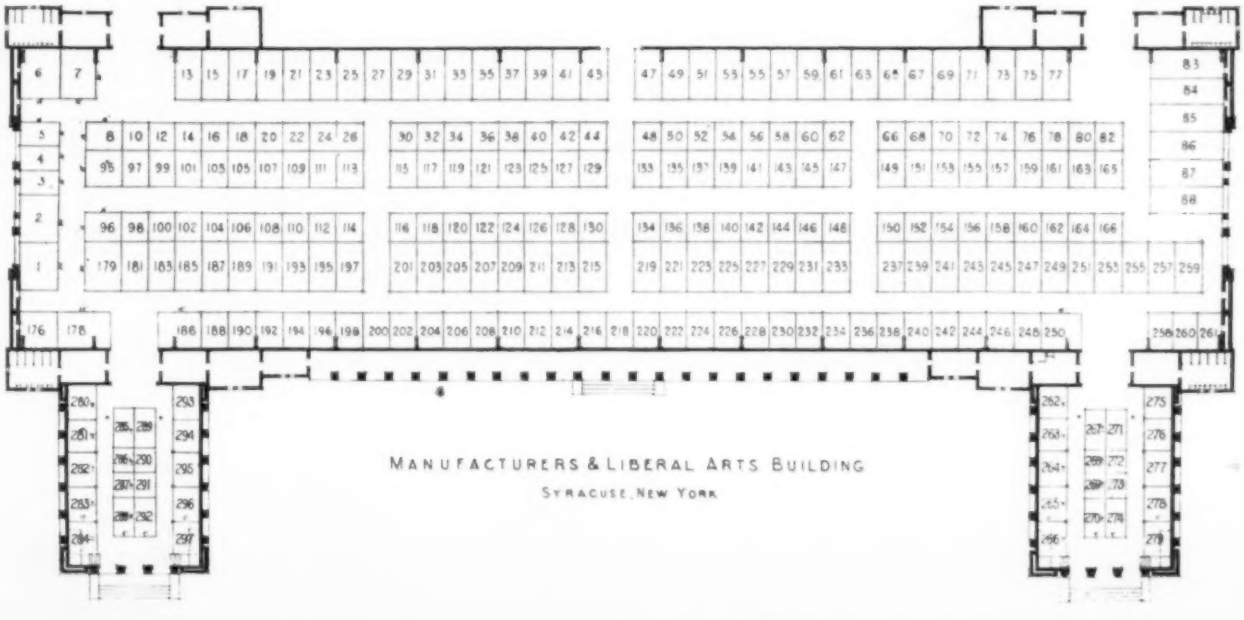

a great many standard and special shapes.

GENERAL ELECTRIC CO., Schenectady, N. Y.—This exhibit will consist of a foundry blower, portable arc welding equipment, crane motor and a motor generator in operation which will furnish direct current for use of exhibitors. C. T. McLoughlin is in charge.

GLOBE STEEL ABRASIVE CO., Mansfield, Ohio—This company will exhibit samples of chilled shot and steel grit used for cleaning castings. Samples of castings showing the condition before and after cleaning with metal abrasives and display material illustrating the economy in the use of metal abrasives will also be shown. The exhibit will be in charge of C. H. McConnell.

GREAT WESTERN MFG. CO., Leavenworth, Kan.—This exhibit will consist of gyratory foundry riddles. Charles F. Murphy will be in charge.

GRIMES MOLDING MACHINE CO., Detroit—This company will display a power rollover molding machine, a hand rollover machine and a small stack molding machine.

H

R. G. HASKINS CO., Chicago—This company will exhibit an assortment of portable, flexible shaft grinding equipment for use in foundry grinding. High speed steel files and grinding wheels for pattern shop use will also be shown. R. G. Haskins will represent the company.

HAYWARD CO., New York—This company, builders of clam shell, orange peel, drag scraper, electric motor buckets and coal handling machinery will be represented at the exhibition.

HERMAN PNEUMATIC MACHINE CO., Pittsburgh—This exhibit will consist of one production type rollover and pattern drawing machine. The following will represent the company: Thomas Kaveny, A. G. Doyle, Richard Harris, Robert F. Ringle, I. J. Oesterling, C. W. Miller, R. P. Morgan, W. W. Hughes, C. S. McMath, Robert M. Porteous, L. L. Johnston, T. O. Renkenberger, T. A. Plassmyer, and Alfred Herman.

HOLCROFT & CO., Detroit—This company will exhibit photographs, drawings and other technical data on furnaces for melting, annealing, and heat treating ferrous and nonferrous metals. New features pertaining to heat treatment of annealing of castings and forgings will also by exhibited. The company will be represented by C. T. Holeroft, H. L. Ritts and C. H. Martin.

I

INDEPENDENT PNEUMATIC TOOL CO., Chicago—This company will exhibit a complete line of pneumatic tools and electric drills for foundry use. The tools will include foundry hammers, pneumatic motor hoists, portable air grinders, and sand rammers. The company will be represented by Adolph Anderson, R. S. Cooper, R. T. Scott, H. G. Keller, J. P. Fletcher, G. H. DuSell, T. J. Clancy, Carl A. Novinger, Fred W. Wunder, E. F. Furrow, Wm. E. Dougherty and C. E. Fowler.

INGERSOLL-RAND CO., New York—This company will exhibit sand rammers, pneumatic motor hoists, chipping hammers, grinders, drills, riveting hammers, and air compressors. George C. Williams, George Kehrer, and John Green will be in charge of the exhibit.

INTERNATIONAL MOLDING MACHINE CO., Chicago—This company will show squeezers and combination squeezers, combination jolt stripping machines, combination jolt turnover machines, jarring machines and coremaking machines. All of the machines will be in actual operation. The company will be rep-

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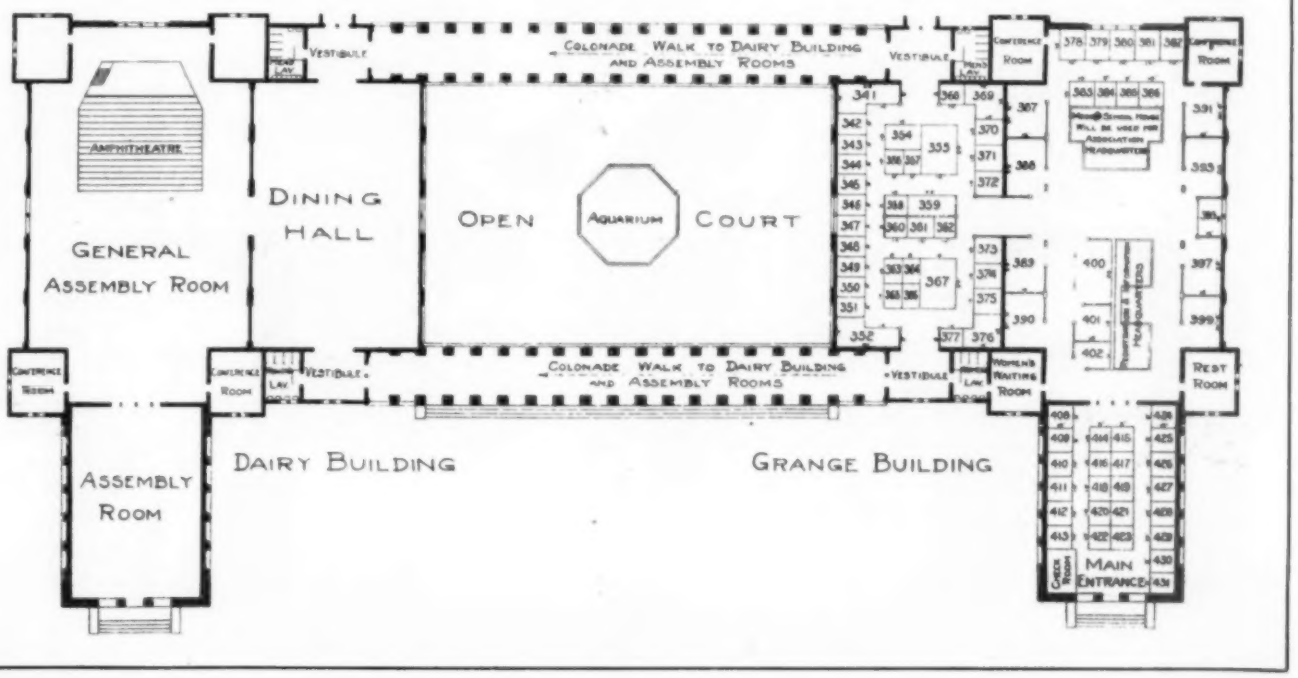
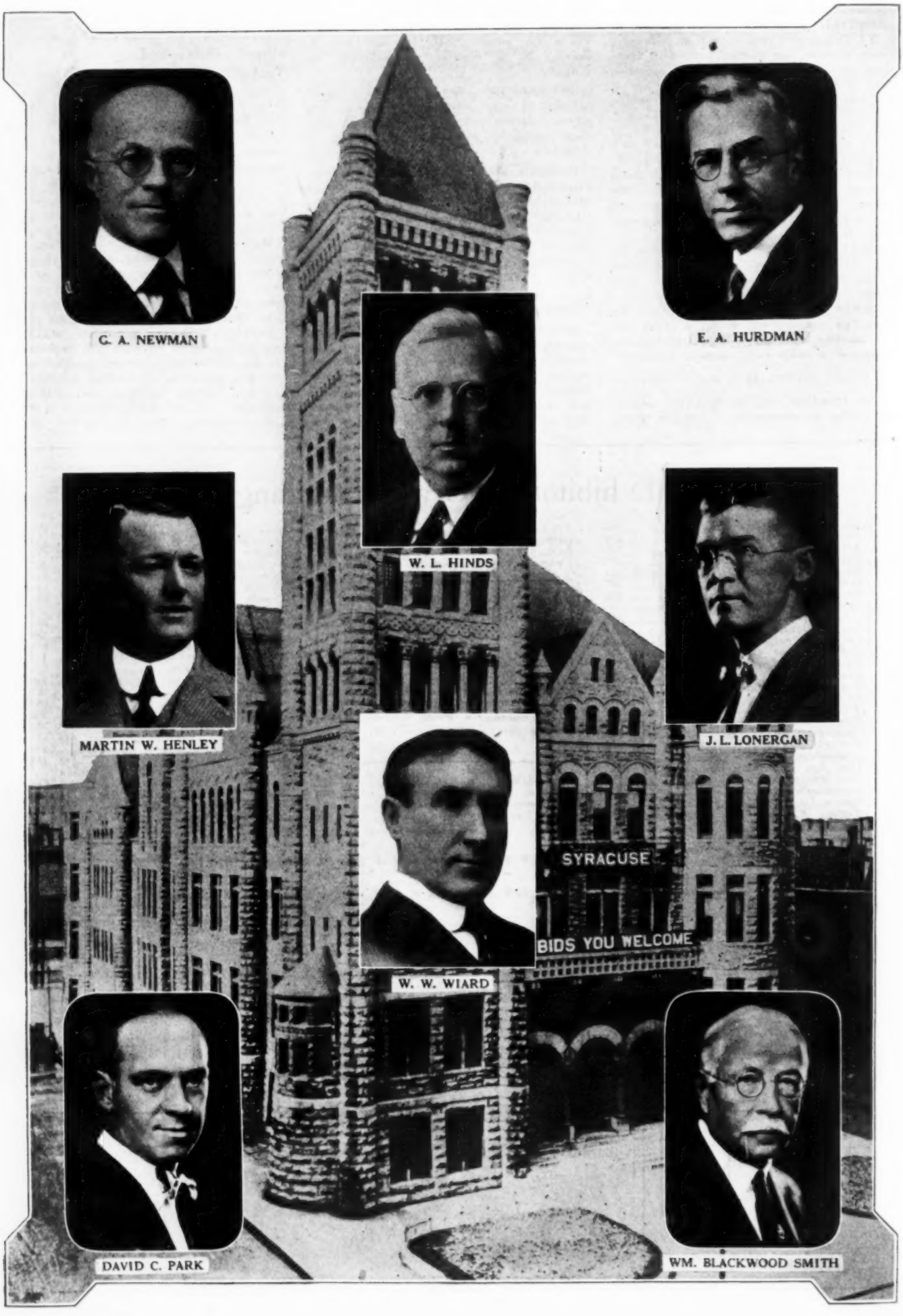



G. A. NEWMAN
E. A. HURDMAN
W. L. HINDS
MARTIN W. HENLEY
J. L. LONERGAN
SYRACUSE
BIDS YOU WELCOME
W. W. WIARD
DAVID C. PARK
WM. BLACKWOOD SMITH

resented by Edward A. Pridmore, W. W. Miller, Carl Levahn, E. G. Borgnis, M. J. Monahan, Luke S. Shannon, Hugh Gallagher, W. J. Rowley, W. J. Briggs, and Frank Seider.

INTERNATIONAL NICKEL CO., New York—This exhibit will consist of samples of iron and steel castings containing nickel. In addition commercial forms of nickel and its alloys will be displayed. The representatives will be F. S. Jordan, R. A. Wheeler, W. J. Calan, A. J. Wadhams, P. De Merica, T. ' Wickenden, Chas. McKnight Jr. and J. S. Vanick.

IRON TRADE REVIEW, Cleveland—This booth will be fitted up as a rest room where those in attendance at the convention are invited to make their headquarters. The representatives will be J. F. Ahrens, Vincent Delport, S. H. Jasper, E. C. Kreutzberg and E. L. Shaner.

J

JENNISON-WRIGHT CO., Toledo, Ohio—Different types of wood block flooring for shop and foundry use will be shown by this company.

JOHNSTON & JENNINGS CO., Cleveland—Molding machines of various types including plain air squeezers, jolt squeezers and stripping machines, jolt squeeze pattern draw and plain jolt machines will be shown by this company. Vibrators, accessories and hard iron tumbling stars will be exhibited also. The exhibit will be in charge of J. L. Battenfeld.

K

CHAS. C. KAWIN CO., Chicago—This booth will be maintained as a rest room for the clients and prospective clients of the company.

WILLIAM H. KELLER, INC., Grand Haven, Mich.—This exhibit will include floor and bench rammers, air operated grinders, drills, riveting and chipping hammers.

KELLER MECHANICAL ENGINEERING CORP., Brooklyn, N. Y.—This company will exhibit a universal radius and cutter grinder, flexible shaft machine and an automatic die sinking machine for use on metal pattern work. The company will be represented by S. A. Keller, Jules Dierckx, Henry Schreiber, Charles Bitter, P. D. Brown, and Maurice Mayer.

SPENCER KELLOGG & SONS, INC., Buffalo, N. Y.—This company will show core oils and sample cores made with these oils. Some finished castings will also be exihibted. The company will be represented by W. L. Goetz, V. A. Acer, J. N. Yaeger, E. G. Allen, E. A. Medbery, H. J. Strassberger, and M. A. Agster.

KNEFLER-BATES MFG. CO., Indianapolis—This company will exhibit core binders and facing flour as well as specimens of cores using the core binder manufactured by this company. The company will be represented by Ernest Knefler, George B. Hill, Herbert J. Bever, and John A. Green.

H. KRAMER & CO., Chicago—This company will exhibit phosphor bronze, yellow brass, red brass and high lead ingots for foundry use. The representatives of the company will be L. Chapman, and I. Kaden.

L

LAMSON COMPANY, Syracuse, N. Y.—This company will exhibit a line of general conveying equipment particularly adapted to the foundry industry. The company will be represented by C. S. Jennings, H. D. Posey, A. E. Hall, and M. V. Z. Belden.

H. M. LANE CO., Detroit—This company will show photographs and blue prints of plants they have erected. The representatives of the company will be H. M. Lane, and G. Pitt.

LAVA CRUCIBLE CO. OF PITTSBURGH, Pittsburgh—This company will show its regular stock line of crucibles and nonferrous melting furnace refractories. This will include crucible and noncrucible furnace covers, rest blocks and special brick shapes. A refractory material for monolithic structures will also be exhibited. The company will be represented by P. L. Berkey, Furman South, Jr., D. E. MacLean, C. E. Peck and A. R. Gallant.

LEEDS & NORTHRUP CO., Philadelphia—Pyrometers and measuring instruments of all kinds will be displayed in this exhibit. G. W. Tall will be in charge.

LINDSAY-McMILLAN CO., Milwaukee—This company will have a display of core oils and specimens of cores made with these oils. Some finished castings will also be shown. The company representatives will be W. R. Pate, J. A. Gitzen, E. W. Carrington, and M. A. Pollard.

LINK-BELT CO., Chicago—Sand handling equipment, conveyor rollers, anti friction idlers, sand revivifiers, car pullers and all types of chains will be displayed by this company. Lantern slides showing various installations of the equipment manufactured by the company will also be shown. R. J. Heisserman, A. J. G. Rapp, W. C. Carter, George O'Conner and Lee Harris will represent the company.

LOUDEN MACHINERY CO., Fairfield, Iowa—Push and pull traveling cranes, swinging cranes, air hoists, monorail track and trolley systems and other equipment necessary for transporting work about the foundry will be displayed by this company. Representatives of the company will be H. M. Miller, L. F. Berthold, W. H. Eldridge, F. C. Harris, J. P. Lawrence, M. A. Spraley, J. A. Niles, P. L. McCain, L. E. Gaston, H. L. Stetser, E. H. Seelbach, O. L. Rosenthal, W. F. Wheatley, W. L. Walker, and W. J. Schwerman.

M

C. E. McARTHUR & CO., Chicago—This company will exhibit gagger machines, rod straightener and shear and wire straightener and shear machine. C. E. McArthur, C. L. Stewart, and Wm. M. Wilson will represent the company.

J. S. McCORMICK CO., Pittsburgh—This company will exhibit a blacking for washing cores, dry sand and loam work and a binder for making and pasting cores. The company will have samples at the booth showing work done with their products.

R. W. McILVAINE CO., Chicago—This company will display details of conveyor parts and photographs of installations of equipment manufactured by them. R. W. and R. L. McIlvaine will be in charge.

MACLEOD CO., Cincinnati—This exhibit will consist of working models of a dust arrester, sand blast hose machine, oil burners and blacking swabs. Representatives in charge will be James Lauder, William Mayor, and David Baxter.

MATHEWS CONVEYOR CO., Ellwood City, Pa.—Various types of ball bearing conveyors for foundry purposes will constitute this exhibit. The company will be represented by F. L. Grady and J. H. Hough.

MATHIESON ALKALI WORKS, INC., Chicago—This exhibit will consist of a graphic display showing methods of refining and desulphurizing iron with cupola flux. Representatives in charge will be G. S. Evans, and J. R. Schmertz.

METAL & THERMIT CORP., New York—Alloys and welding compounds will be shown by this company.

METAL IMPROVEMENT CO., Cleveland—A purifier and desulphurizer for cast iron and malleable iron will be exhibited by this company with castings showing the effect of using this product. The representatives will be C. T. Hennig, W. V. Berry and G. A. Drysdale.

H. E. MILLS MFG. CO., Syracuse, N. Y.—This exhibit will consist of facing, parting and other foundry supplies. The representatives will be J. M. Shannon and J. R. Webster.

MILWAUKEE FOUNDRY EQUIPMENT CO., Milwaukee—Power squeezers, jolt squeezers, and jolt strippers will be exhibited by this company. E. J. Byerlein, L. E. Gregory and T. J. Magnuson will represent the company.

MODERN POURING DEVICE CO., Port Washington, Wis.—This company will exhibit a complete line of pouring equipment including an automatic pouring device. Different types of crane construction will be shown also.

MONARCH ENGINEERING & MFG. CO., Baltimore—This company will exhibit an oscillating melting furnace, oil-gas stationary crucible furnace, die casting furnace, dross reclaiming furnace, combination core oven, sand sifter, ladle heater, bearing lining furnace, positive blower, oil fired cupola, coke-fired tilting furnace and stationary bottom for iron pot furnace. The company will be represented by George Schimpf, H. D. Harvey, J. V. Martin, F. P. Maujean, W. H. Raber, and W. Chenowith.

MORSE CHAIN CO., Ithaca, N. Y.—This company will exhibit several silent chain drives in operation.

N

NATIONAL ENGINEERING CO., Chicago—This company will exhibit a complete sand preparing unit which will include a sand mixer and aerating machine. The representatives of the company will be H. S. Simpson, B. Castor, W. J. Bell, H. N. Schreuder, C. J. Skeffington, W. C. Edgar and C. D. Hollins.

NEW HAVEN SAND BLAST CO., New Haven, Conn.—This company will exhibit a direct pressure sand blast barrel. Donald S. Sammis, G. C. Fatscher, S. S. Parsons and W. R. Matteson will represent the company.

NEW YORK AND PENNSYLVANIA CLAY PRODUCTS CO., Rochester, N. Y.—This company will exhibit a bond for rehabilitating old molding and core sand. A practical demonstration of the use of this bond will be carried on. The representatives will be R. L. Cleland, S. H. Cleland, and R. L. Pinkley.

WM. H. NICHOLLS CO., Brooklyn, N. Y.—Various sizes of molding machines including plain jolt machines, jolt squeezers, jolt squeeze and stripping machines, and magnetic drawing machines will be on display at this booth.

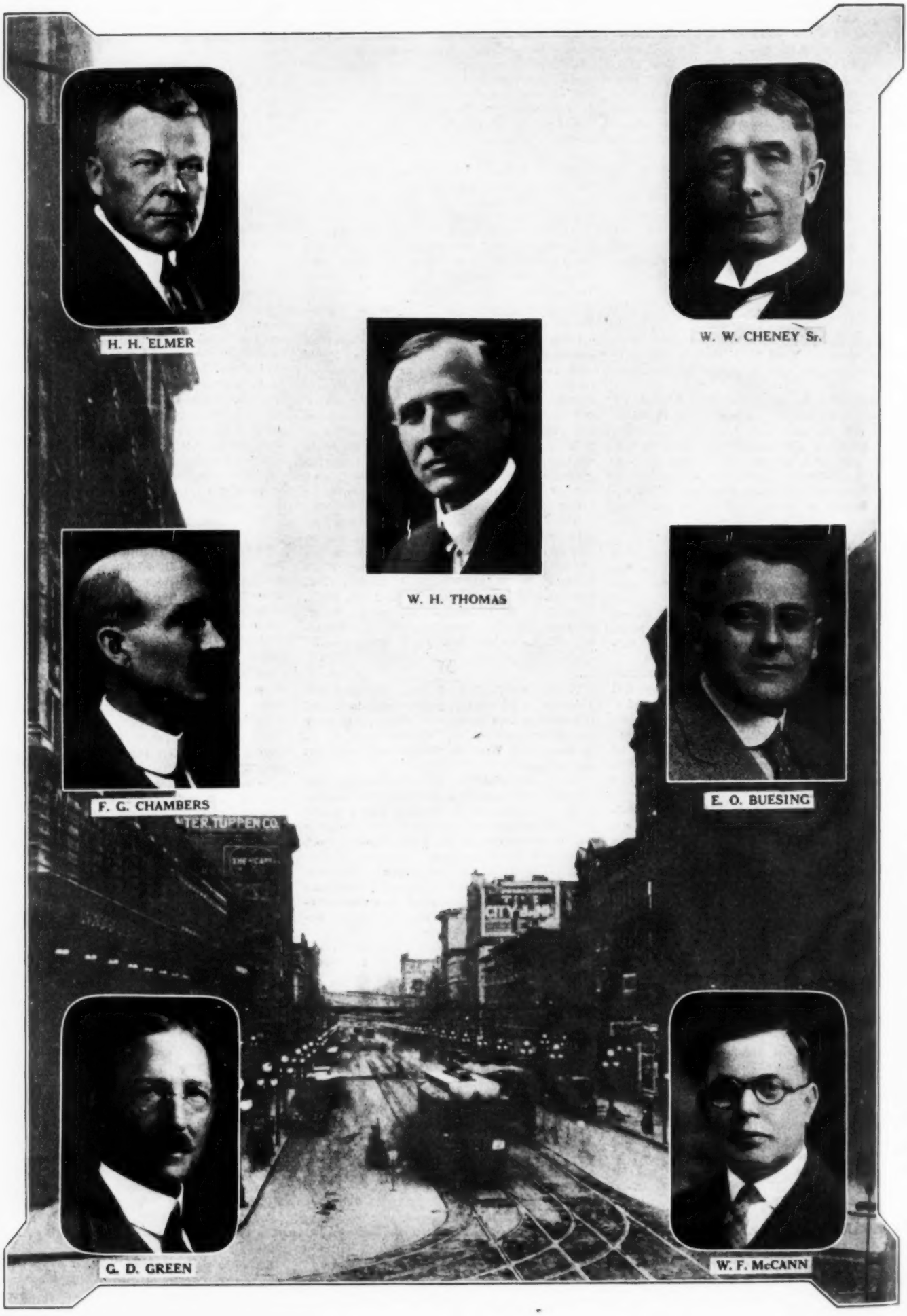
NORMA-HOFFMANN BEARINGS CORP., Stamford, Conn.—Precision ball bearings, precision thrust bearings, roller journal bearings of standard and self-aligning and other types will be displayed by this company. The exhibit will be in charge of F. W. Mesinger.

NORTON COMPANY, Worcester, Mass.—This exhibit will consist of various kinds of grinding wheels, refractories wear and a line of motor driven floor stands. The exhibit will be in charge of Herbert Duckworth. C. H. Baker Jr., and F. W. Elya.

O

S. OBERMAYER CO., Chicago—A line of foundry supplies will be displayed by this company.

OILESS CORE BINDER CO., Cleveland—This exhibit will consist of the core binder made by this company with specimen cores using the binder. Steel and iron castings will also be displayed. H. A. Baker, J. A.


H. H. ELMER
W. W. CHENEY Sr.
W. H. THOMAS
F. G. CHAMBERS
E. O. BUESING
G. D. GREEN
W. F. McCANN

Hamilton and H. B. Fischer will represent the company.

GEORGE OLDHAM & SON CO., Baltimore—Pneumatic chipping hammers foundry rammers, riveters, scalers and other accessories will be exhibited by this company. R. W. Nelson and N. A. Pelham will represent the company.

OLIVER MACHINERY CO., Grand Rapids, Mich.—Pattern shop machinery including a milling machine, arbor saw bench, portable saw bench, band saw, arbor jointer, portable jointer, surfacer, lathe, sander, arbor borer, wood trimmer, grinder, patternmakers' bench, and electric band saw brazer will be displayed. The representatives will be: P. A. D'Archangel, C. A. Ginter, A. S. Kurkjian, Arthur Blake, J. E. McLauchlen, and Thomas A. Renwick.

OSBORN MFG. CO., Cleveland—This company will exhibit a rollover squeeze and pattern draw molding machine, jolt squeezing machine, jolt stripper machine, jolt rollover machine, coremaking machine, jolt squeezing stripper machine. The company will be represented by F. G. Smith, E. S. Carman, M. W. Zeman, E. T. Doddridge, J. C. Alberts, F. T. Spikerman, R. E. Kiefer, H. B. Klar, J. F. Howard, Ward Dougherty, H. W. Hisey, E. F. Oyster, and G. W. Sawitzke.

OXWELD ACETYLENE CO., New York—Welding apparatus and supplies together with oxygen acetylene cylinders and lump carbide will be exhibited. The representatives will be J. W. Dunn, G. R. Mitchell, C. H. Mitchell, J. R. Hughes, and A. R. Herson.

P

PANGBORN CORP., Hagerstown, Md.—This company will show new type sand blast as well as dust arrester equipment and steel abrasives. Thomas W. Pangborn, John C. Pangborn, H. D. Gates, P. J. Potter, Foster J. Hull, George A. Cooley, Jesse J. Bowen, W. T. Randall, Charles T. Bird and W. C. Lytle will represent the company.

PATENT CEREALS CO., Geneva, N. Y.—This company will exhibit core and facing binder with some specimens of cores using this binder, photographs, etc. The exhibit will be in charge of T. K. Fahy and A. N. Duncan.

J. W. PAXSON CO., Philadelphia—This company will show blueprints, models, etc., of the foundry equipment of its manufacture. The booth will be in charge of H. M. Bougher.

PENTON PUBLISHING CO., Cleveland—This booth will be fitted up as a rest room where those in attendance at the convention are invited to make their headquarters. The representatives will be H. Cole Estep, F. V. Cole, and J. D. Pease.

CHARLES PETTINOS, New York—A complete assortment of molding sands and foundry supplies will constitute this exhibit. Charles Pettinos will be in charge.

PICKANDS, BROWN & CO., Chicago—This company will exhibit foundry coke and will be represented by G. A. T. Long and C. M. Pearson.

PITTSBURGH CRUSHED STEEL CO., Pittsburgh—This company will exhibit steel abrasives for use in sand blast machines. Sand blast machines in operation will be used to demonstrate the action of the abrasives with various kinds of castings before and after cleaning. G. H. Kann and H. M. Ream will be in charge of the exhibit.

PITTSBURGH ELECTRIC FURNACE CORP., Pittsburgh—This company will have in operation an electric furnace making gray iron castings. The furnace will be completely equipped and have an automatic regulating device in connection. The company will be represented by W. B. Wallis, W. E. Moore, G. L. Simpson, H. E. Bromer, R. D. Thomas, Alexander Haigh, Bresley Hamilton, O. J. Abell, M. A. Beltaire, and W. L. Kammerer.

PORCELAIN ENAMEL & MFG. CO., Baltimore—This company will have a booth fitted up to entertain visitors at the convention. Karl Turk, Frank G. Roberts, W. Russell Greer, Paul Klaesius, and Herbert Turk will be in attendance.

PORTAGE SILICA CO., Youngstown, O.—Silica rock from the natural state to the finished product including various grades of steel molding, core and sand blast sands will be exhibited by this company. The representatives will be E. E. Klooz, C. F. Eberhart, and L. R. Farrell.

PORTER-CABLE MACHINE CO., Syracuse, New York—This company will exhibit pattern shop sanders and grinders, band saws, toolroom lathes, production lathe and a universal milling attachment. A. N. Emmons and D. J. Ridings will represent the company.

BERNARD H. PRACK, Pittsburgh—Photographs of foundry and manufacturing plants designed by this company will be shown. Bernard Prack, A. E. Prack, Fred Prack, W. G. Prack, W. L. Miller, and B. D. Fuller will represent the company.

HENRY E. PRIDMORE INC., Chicago—This company will exhibit a core machine, a combination air jolt power rockover molding machine and a combination jolt squeezer and power stripping plate machine. The representatives will be Mrs. E. M. Pridmore, H. A. Pridmore, F. W. Hamel, M. E. Pridmore, H. F. Burggraf, E. B. Pridmore and E. F. Tierney.

R

RIVETT LATHE & GRINDER CO., Boston—Motor driven internal grinder and a back geared precision lathe with attachments will constitute this company's exhibit. E. P. MacCannell, A. L. Hathorne and H. E. Baker will represent the company.

ROBESON PROCESS CO., New York—Core binders with cores of various shapes and sizes made from these binders will be exhibited by this company. The representatives will be Gordon I. Lindsay, B. W. Bullen, T. J. Rayn, T. J. O'Hara, and J. A. Smith.

ROLLWAY BEARING CO INC., Syracuse, N. Y.—This company will exhibit heavy duty roller bearings and some adapter type housings. The company will be represented by E. J. Lybert, Samuel Farrell, S. J. Kaiser, J. H. Evans, F. H. Buhlman and J. T. R. Bell.

ROSS-TACONY CRUCIBLE CO., Philadelphia—Graphite crucibles for melting steel and nonferrous metals, graphite stopper heads for bottom pour ladles, graphite nozzles, sleeves, and special shapes, etc., will be displayed by this company.

P. H. & F. M. ROOTS CO., Connersville, Ind.—This company will have a booth fitted up to entertain visitors at the convention. The booth will be in charge of H. M. Papworth, E. D. Johnston, and L. A. Snyder.

ROYER FOUNDRY & MACHINE CO., Wilkes Barre, Pa.—This company will exhibit a working model of a sand separator and blender equipped with a new sand combing belt. Machines equipped with self loaders to eliminate shoveling will be shown also. The representatives will be G. F. Royer, John Lloyd, Alexander Haigh and David D. Baxter.

RUEMELIN MFG. CO., Minneapolis—This company will exhibit sand blast cabinets with plain and revolving tables, sand blast curtains, generators, guns, sand sifters, exhaust fans, dust collectors.

S

SAFETY EMERY WHEEL CO., Springfield—Motor driven floor and portable grinders, belt driven grinders, grinding wheels, abrasive specialties, and safety collars will be exhibited by this company. Robert K. Noble, and W. H. Vance will be in charge of the exhibit.

SAFETY EQUIPMENT SERVICE CO., Cleveland—Safety equipment including industrial goggles, respirators, gas masks, fireproof leggings, asbestos clothing and gloves and warning signs will be exhibited by this company. The company will be represented by H. L. Wood, D. E. Kimball, and B. W. Nutt.

SHEPARD ELECTRIC CRANE & HOIST CO., Montour Falls, N. Y.—Cupola chargers arranged for cage and floor control, drop bottom charging buckets, electric hoists, speed reducers, and other hoist mechanism will be exhibited by this company. The company will be represented by F. A. Hatch, R. H. McGredy, R. T. Turner, G. L. Drake, and H. D. Crout.

SKEPPSTEDT-ERICKSON CO., Moline, Ill.—This company will exhibit a multiple core machine in operation. An adjustable core bench and sample castings with cost and production figures will be shown also. E. G. Erickson. Olaf Skeppstedt and Leon Somers will represent the company.

SKYBRYTE CO., Cleveland—Liquid window cleaner and demonstrations of its application will be given by this company. V. S. Loventhal will be in charge.

W. W. SLY MFG. CO., Cleveland—Sand blast room, sand blast cabinet, sand blast table, tumbling mill equipment, dust arrester and an operating exhibit of a pneumatic sand reclaimer will be displayed in this exhibit. The company will be represented by S. C. Vesay, G. A. Boesger, F. A. Ebeling, C. P. Guion, D. P. Carter, M. T. Mortensen, L. B. Brewster, D. L. Harris, H. C. Nicholas, R. O. Mullen, W. L. Kammerer and R. W. Hasselle.

WERNER G. SMITH CO., Cleveland—Core oils and specimen cores made from these oils will constitute this exhibit. The company will be represented by W. G. Smith, M. S. Finley, N. A. Boyle, Frank Dodge, J. M. Glass, L. P. Robinson, Thomas Procter, W. E. Rayel, I. M. Gerteis, M. M. Werckman, C. H. Graham, E. H. Heartlein and L. F. Ferster.

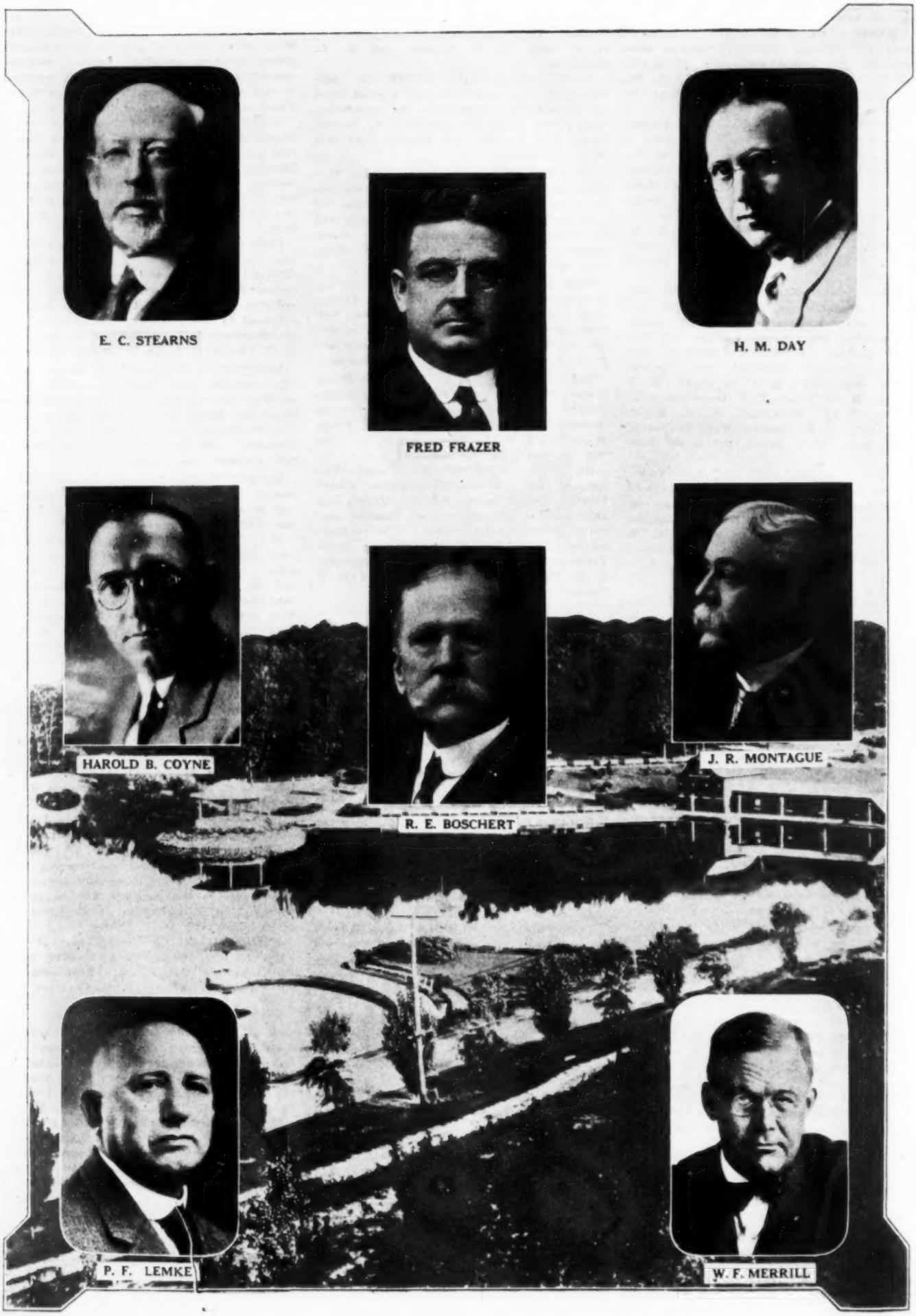
SPENCER TURBINE CO., Hartford, Conn.—Compressors for supplying air for foundry cupolas and for oil and gas burning furnaces, all of which are electrically driven will be exhibited by this company. The representatives will be S. E. Phillips, H. M. Grossman, W. G. Cross and O. J. Duigee.

STANDARD SILICA CO., Chicago—A display of silica, foundry and abrasive sands will constitute this exhibit. Representatives will be A. C. Goodnow, F. D. Chadwick and R. W. McCandlish.

STERLING WHEELBARROW CO., Milwaukee—This exhibit will consist of foundry flasks, wheelbarrows and other foundry specialties. The company will be represented by L. P. Robinson, G. H. Lambkin, L. E. Washer, J. J. Coyne, H. J. Felsburg, J. M. Dickson, O. E. Steep, H. H. Baker and R. F. Jordan.

FREDERICK B. STEVENS, INC., Detroit—Portable core ovens, foundry facings and buffing compositions will be shown in this exhibit. Suitable arrangement for the reception of visitors will be made also. The representatives will be F. B. Stevens, W. H. J. Cluff, J. H. Mayers and L. H. Kirby.

STONEY FOUNDRY ENGINEERING & EQUIPMENT CO., Cleveland—Vibrators, molding machines, shakeout bails of various descriptions and a core knockout machine will


E. C. STEARNS
FRED FRAZER
H. M. DAY
HAROLD B. COYNE
R. E. BOSCHERT
J. R. MONTAGUE
P. F. LEMKE
W. F. MERRILL

be exhibited by this company. The company will be represented by J. T. Stoney, E. S. Cohen, L. J. Reinhard and Joe Soukop.

SULLIVAN MACHINERY CO., Chicago—A compound air compressor directly connected to a synchronous motor to supply air to the exhibitors will be in operation. The exhibit will include smaller compressors, compressed air hoists and compresed air tools for core removal.

SWARTWOUT CO., Cleveland—Photographs of installations of equipment manufactured by this company will be shown. The representatives of the company will be P. F. Mayer, G. H. Thomson, D. C. Prewson and Mr. Smith.

WILLIAM SWINDELL & BROTHERS, Pittsburgh—This company will exhibit a 1000-pound electric melting furnace and will be represented by E. H. Swindell, F. W. Brooke, R. W. Porter and G. P. Mills.

SYRACUSE SUPPLY CO., Syracuse, N. Y.—Core wire straightening machines, disk grinders, radial drills, shapers, lathes, screw machines, high speed sensitive drill presses, heavy duty turret lathes and milling machines, all in operation, will be exhibited by this company. Representatives of the company will be W. H. Birdsall, C. L. Reasel, F. B. Scott Jr., G. W. Mullinger, E. J. Gale and H. D. Mozeen.

T

TABOR MANUFACTURING CO., Philadelphia—Jarring machines both plain and shockless; plain squeezers, jar squeezers, jarring stripping plate machines will be on display at this booth.

E. ARTHUR TUTEIN, Boston—This company will exhibit pig iron of various grades such as foundry, malleable, basic and forge grades. Cokes, tar, sulphate ammonias and benzols will be shown also. The representatives will be E. Arthur Tutein, D. A. Tutein, H. A. White, F. E. Townley, T. C. Wilson, A. D. Darragh, H. E. Yeager and G. S. Sank.

TRANSMISSION BALL BEARING CO., Buffalo—Ball bearings for power transmission and machine application will be displayed in this exhibit. A swing frame grinder, motor and ball bearing equipped, will be shown for the first time by this company. The representatives of the company will be C. M. Murray, T. H. Kilgore, R. L. Schuyler, E. Hambleton, B. C. Brown and Mr. Barnes.

TRUSCON STEEL CO., Youngstown, O.—This company will exhibit alloy steel flasks, bottom boards, core plates, core racks, snap flask bands, platforms and boxes. The representatives of the company will be G. F. Sparks, N. C. Ferreri, H. W. Jencks, G. E. Madden, C. H. Watt, L. S. Todd, A. L. Abrahams, P. A. Nuttall and J. C. Peirce.

U

UNITED COMPOUND CO., Buffalo—This company will show vent wax and pattern wax. W. F. Bradley and L. F. Leney will represent the company.

UNITED STATES GRAPHITE CO., Saginaw, Mich.—Blackings for core washes and plumbago for various foundry uses will be exhibited by this company. O. R. Miller will be in charge.

UNITED STATES SILICA CO., Chicago—This company will exhibit sand blast abrasives with specimen castings cleaned by this method. A Bacharach flow meter attached to sand blast equipment to show air consumption will be in operation. Blue prints and fittings for various sized air lines will be shown also. The representatives of the company will be Volney Foster, H. F. Geobig, O. M. Olsen and Walter Kent.

W

WADSWORTH CORE MACHINE & EQUIPMENT CO., Akron, O.—Core making machines, cutting off and coning machines, core trays and bottom plates will be shown by this company. George H. Wadsworth and M. C. Sammons will represent the company.

WALDO, EGBERT & McCLAIN, INC., Buffalo—All grades of pig iron, by-product and beehive foundry coke, coal, steel and fuel oil will be displayed by this company. The company will be represented by F. J. Waldo, Justus Egbert, L. G. Calkins, A. F. Stengel, M. F. Selbert, Fred E. Gross and Harry R. Defler.

WARNER & SWASEY CO., Cleveland—This company will exhibit a universal hollow hexagon turret lathe in operation. Two types of pneumatic grinders also in operation will be shown. A full line of machines and parts will be displayed in connection with the working exhibit. The representatives of the company will be C. J. Stilwell, A. H. Keetch, H. R. Ward and J. A. Craig.

WILBUR WATSON AND ASSOCIATES, New York—This exhibit will consist of photographs, circulars, pamphlets and general data covering the field of operation of this company. Charles D. Watson and Stanley H. Chadwick will represent the company.

WESTINGHOUSE TRACTION BRAKE CO., Pittsburgh—A motor driven air compressor with automatic control, a main reservoir, several types of air operating valves suitable for both single and double acting cylinders, air cutout cocks, air hose and fittings, etc., will be exhibited by this company. The representatives will be M. H. Burchard, O. H. Miller, S. A. King Jr., F. C. Young, S. B. Schrontz, R. G. Justus and W. C. Burriss.

WHITEHEAD BROS. CO., Buffalo—This exhibit will consist of foundry sands, clays, gravels, facing and supplies. The representatives will be A. J. Miller, C. E. Andrews, J. H. Whitehead, R. L. Carpenter, V. L. Whitehead Jr., T. Hogan, A. Y. Gregory, F. B. Clarke, A. W. Jacus, H S. Depew, A. McBride and H. B. Hanley.

WHITING CORP., Harvey, Ill.—This exhibit will consist of photographs, catalogs and drawings of equipment manufactured by this company. The Grindle Fuel Equipment Co. will occupy space also in these booths. Representatives will be J. H. Whiting, W. R. Hans, T. S. Hammond, R. H. Bourne, A. H. McDougall, J. S. Townsend, R. E. Prussing, Don Reese, P. B. Crousse, J. R. Bates and A. J. Grindle will represent the Grindle Fuel Equipment Co.

G. H. WILLIAMS CO., Erie, Pa.—This company will display a single line clam shell bucket. A new sheave yoke attachment for this bucket will be shown also. In addition a miniature crane with a model bucket automatically operated will be exhibited. The representatives will be P. T. Robin, T. D. Harter, G. E. Monroe and A. J. Lichtinger.

WORTHINGTON PUMP & MACHINERY Co., Cincinnati—A 350-foot air compressor belted to a slip-ring motor will be in operation. In addition there will be shown a core wire straightener and a sand riddler. William J. Daly, F. W. Hankins, J. A. Bowers and C. C. Scott will represent the company.

Y

YALE & TOWNE MFG. CO., Stamford, Conn.—A 1000-pound electric chain hoist and a 2-ton push button control slow speed electric chain hoist will be exhibited by this company. The display also will include hand blocks, trucks and a working model of a spur geared block. The exhibit will be in charge of H. J. Fuller.

YOUNG BROS. CO., Detroit—This company will exhibit a test oven with sample of products baked. An operating model of a new continuous compensating oven will be shown also. The representatives of the company will be T. P. McVicker, H. M. White, V. A. Fox, M. C. Murdoch, R. E. Reed, C. G. Lisch, F. A Meyer and G. I. Thatcher.

Hold Your Horses!

Here Come

The Ball Players!

SINCE the first announcement of the ball game to be played at Syracuse, on Thursday afternoon, Oct. 8, between a team made up from among the exhibitors and another composed of foundrymen, rivalry has been keen. Walt Nantke, Dock & Mill Co., North Tonawanda, N. Y., who is managing the first mentioned aggregation of stars has announced a portion of his lineup. For pitcher he has signed W. J. Schwerman, Louden Machinery Co., Fairfield, Ia., former college player who stands 6 feet 2 inches in his bathing suit, has freckles and red hair. All these details are given by Pitcher Schwerman's manager, Mr. Miller. Perhaps he believes that the proposed attraction at Syracuse is to be a beauty contest. W. D. Shaw, Carborundum Co., Niagara Falls, N. Y., former coach of the Nashville, Tenn., team will cover third or short stop or both. Roy Louden, of the same company that will provide the pitching talent, and who is said to have seen some ball games will play, as will also H. T. Herr, J. S. McCormick Co., Pittsburgh and R. B. Ferguson.

In telling a representative of THE FOUNDRY *about his plans, Manager Nantke inferred that some of the members of the foundrymen's team doubtless will favor playing the game with cantaloupes. This is resented by the foundrymen, who have ordered a consignment of cast iron balls to be made by T. F. Jennings, Utah Copper Co., Garfield, Utah.*

Manager Sam Jasper, of the foundrymen's aggregation, is preserving crafty silence as to his plans. However, he is said to have signed up George Herman Ruth, a well known eastern foundryman, Walter Johnson whose casting experience was gained in the nation's capital ,and Tyrus Cobb, head of a cleaning gang in Detroit.

Institute of Metals Holds Fall Meeting

The autumn meeting of the Institute of Metals was held at Glasgow, Sept. 1-4 and was largely attended. The meetings were held in the Rankine hall where 16 papers were presented.

Prior to the general gathering, the fourth autumn lecture by Sir John Dewrance, vice president, was given on "Education, Research and Standardization," Sir John said there are not sufficient openings for research workers and that there now are 24 research associations covering most of the principal industries. The lecturer pointed out the enormous savings effected by improvements resulting from research, especially in connection with the steel trade.

A comprehensive paper was given by George Brinton Phillips, Philadelphia, on "The Primitive Copper Industry of America." The paper was largely historical giving particulars of the numerous objects produced by Indians. He mentioned that American copper is remarkably pure, analyzing 99.90 per cent copper with traces of silver and iron, whereas foreign copper much more impure assayed at 98 per cent.

Another paper contributed by an American was on "The Effect of Low Temperature Heating on the Release of Internal Stress in Brass Tubes," by Robert J. Anderson Cleveland. The writer gave the results of experiments indicating that mill control of separate lots of tubing must be substantially identical if a given heat treatment procedure is to be applied to the material. The object of the investigation was to determine the suitable heat treatment to prevent warping, and it was ascertained that heating brass tubing for two or three hours at 325 degrees Cent., or for four hours at 300 degrees Cent., in the case of material reduced to 22.4 per cent in area would materially reduce the stress without affecting the hardness much and with practically no loss in tensile strength.

A paper on "Thermo-Conductivities of Industrial Nonferrous Alloys" by J. W. Donaldson, dealt with high tensile brass, manganese bronze, admiralty gun metal and white bearing metal, from which he concluded that increasing the temperature increased the conductivities of all the alloys. Nickel lowered considerably the conductivity of an alloy.

A paper was presented by Harry Hyman on the "Properties of some Aluminum Alloys." He concluded that aluminum alloys available for sand castings for engineering purposes generally possessed low ductility which rendered them difficult to manipulate in workshop practice and on board ship they were generally susceptible to corrosion. A series of alloys was prepared with a view to passing a minimum test of 5 tons yield point, 10 tons breaking stress, and 5 per cent elongation on sand cast test bars, and at the same time capable of undergoing the severe salt spray corrosion test without marked loss in weight. The alloy B. S. 7 containing copper, nickel, iron and magnesium gave the most promising results and has been adopted on a commercial scale. Fatigue tests show the metal to be reliable under alternating stress and it may be re-melted several times without deterioration.

What faces have YOU filed in memory's vaults?

Several works were visited including the Fairfield Shipbuilding & Engineering Co.; G. & J. Weir, Ltd. Cathcart, and the North British Locomotive Co., Ltd. The last day of the meeting was devoted to a trip to the Trossachs and Loch Lomond.

Skin-Dried Mold Presents Scabbed Surface

Question: We make a certain line of castings ranging in weight from 100 to 500 pounds which must present a clean, smooth surface to take a porcelain enamel finish. Notwithstanding the fact that the molds are skin-dried the castings are scabbed and cut. We spray the mold with our usual core wash made up of plumbago and molasses water. The molder then goes over the surface with a camels hair brush dipped in a thin solution of molasses water to impart a nice smooth surface to the mold. The mold is skin dried with an oil torch designed for the purpose. We shall appreciate any information on the proper procedure to follow in skin drying a mold; what blacking to use, how to mix it and the correct proportion of molasses to add to any given amount of water.

Answer: From the foregoing details and assuming that your sand is suitable for the work in hand we should say that you are either burning your molds or not drying them sufficiently. A considerable degree of skill is required to manipulate an oil torch properly and it should not be intrusted to a person who is not acquainted with its peculiarities. Where the mold is of such a character that the torch can be placed inside and allowed to dry the mold from a fixed position, little trouble may be anticipated. It may be necessary to change the position once or twice, but that is all. Where it is necessary to hold the torch in the hands and direct the flame to various points on the surface of the mold in turn, the greatest care is required to secure an even distribution of the heat. If the flame is allowed to play too long on one point the skin of the mold becomes burned and will cut away in front of the molten iron. If the skin of the mold is not sufficiently dried at any point it will buckle or scab from the pressure exerted by the steam generated at that point when it is covered with iron. The most satisfactory method is to keep the torch moving all the time until the entire surface of the mold has been dried to an approximate depth of half an inch. In this connection it is pertinent to point out that if the sand forming the body of the mold is fairly damp and if the mold is allowed to stand several hours after it has been dried, the dampness will work to the face again and the drying process will be nullified.

Oil torches must be watched carefully and the air and oil valves adjusted to compensate for frequent changes in air and oil pressure. Occasionally the pressure varies and a quantity of free oil is sprayed on the mold. This acts as a protection and prevents the heat from penetrating the sand.

The trouble you refer to may be due to your sand or the manner in which it is rammed. It may be too fine and close and not sufficiently porous to carry away the extra steam generated as a result of using wet blacking. The obvious remedy is to use a coarser sand or to open your present sand with a liberal dose of sharp sand. Fine sand is not required to produce a smooth skin on a skin-dried casting. Your men may be ramming the sand close to the pattern and of course that will produce scabs whether the mold is made in green or dried sand.

A wash composed of molasses water and plumbago and applied in the manner indicated in your inquiry is regarded as standard practice. It is mixed in the proportion of about one pint of molasses to 1 pail of water. The plumbago is stirred in, usually by hand, until the mixture has assumed the consistency of thick cream.

Traffic Signal Systems Use Many Castings

Syracuse Foundry Makes Parts for Traffic Control Installations and Equipment for Electrical Wiring Work on Production Basis

Fig. 2—The Case Containing the Signal Lights and the Bracket Are Cast

By Frank G. Steinebach

CITIES today are finding the control and regulation of traffic their most serious and pressing problem as the popularity and number of motor vehicles continue to increase. Just a few years ago when the horse was a familiar sight on the streets of the city, there was little necessity for extensive methods of controlling traffic. One policeman stationed at the busiest intersections easily controlled and directed the flow of traffic with a wave of his arm. At that time collisions were rare, due perhaps to an abundant supply of that attribute called horse sense, which seemed to prevent one horse from running into another.

The founders of our cities did not dream of the vast demands that in time would be placed on the streets by motor traffic and consequently many of the cities were laid out with exceptionally narrow streets, this being especially true of the older cities of the East. Because of this crowded condition and due to the fact that often several feet on each side of the street are devoted to parking, the widespread use of the automobile for business and personal use has so congested traffic that systematic regulation is necessary to speed the movement of vehicles, prevent accidents and jaywalking by the pedestrian.

An officer stationed at the middle of the intersection was the first attempt at regulating traffic. This plan was employed when the automobile first became a traffic problem. As the congestion increased, this traffic director was given a

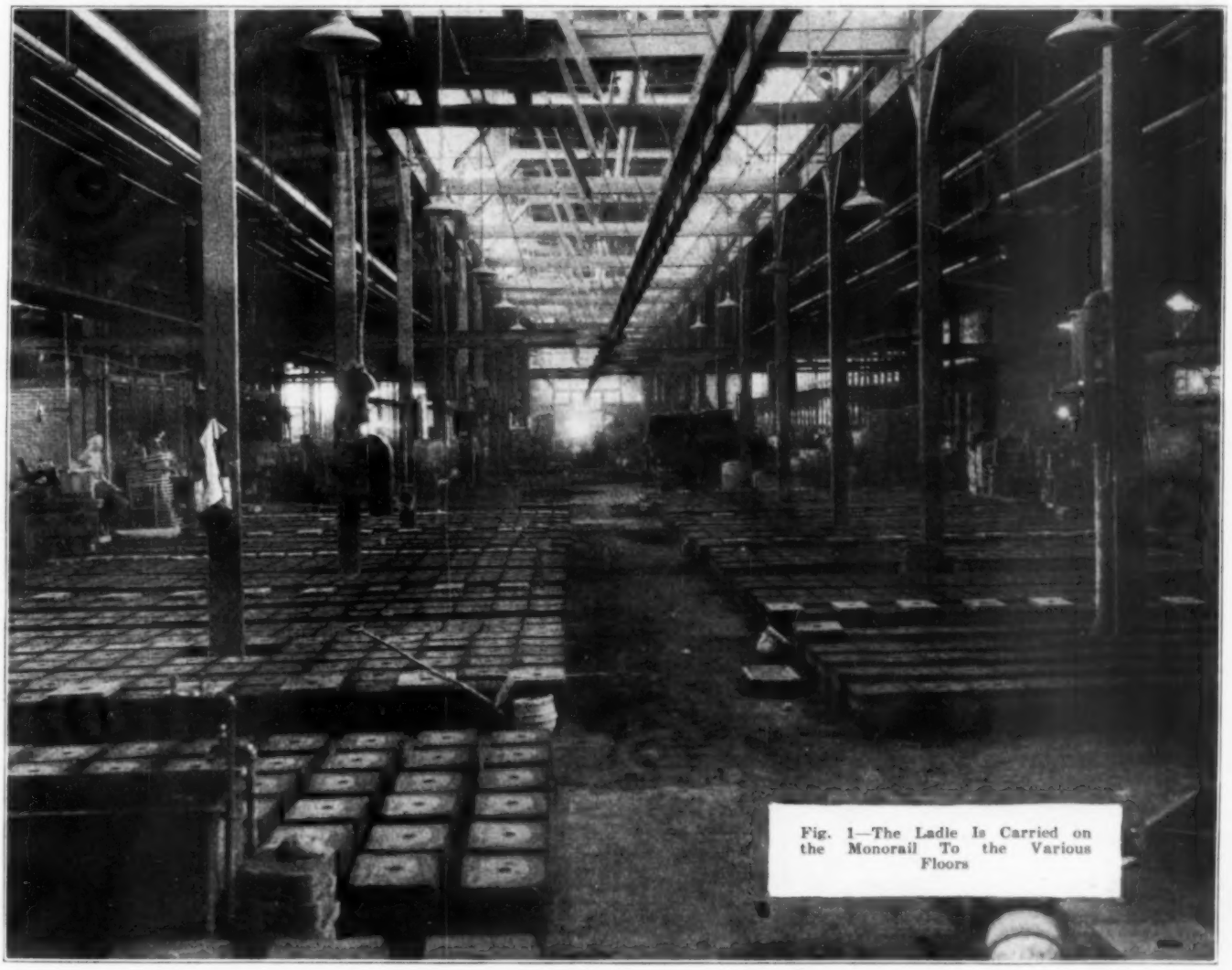


Fig. 1—The Ladle Is Carried on the Monorail To the Various Floors

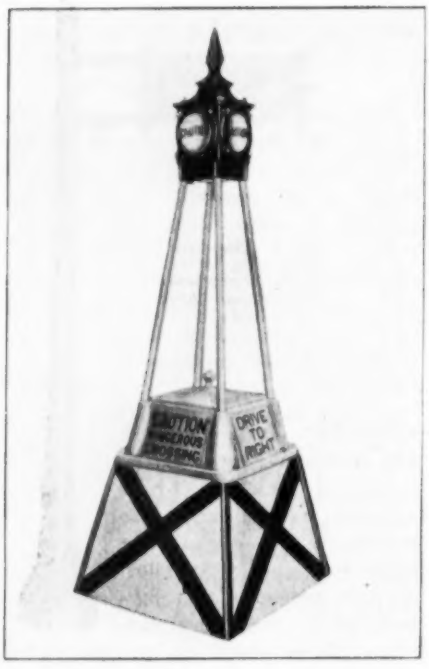


FIG. 3—ELECTRIC FLASHING BEACONS ARE USED TO SIGNAL DANGEROUS INTERSECTIONS

semaphore, which merely is a sign with four arms at right angles, the word **GO** being painted on two opposite arms and the word **STOP** on the remaining two. These semaphores, turned in the proper direction to regulate the flow of traffic, are used at night with the assistance of colored lanterns, but are of little value in congested districts, although successfully employed away from crowded portions of the city. The semaphore was supplemented by a whistle code, giving the drivers a chance to look or listen.

A study of the causes of many traffic ills has led to the conclusion that traffic will move more quickly and smoothly if traffic officers operate in unision throughout an entire congested district. This is accomplished by providing a system of communication, interlocking all of the signals in the district. As it became more and more difficult for the policeman with the semaphore to dispatch the vehicular traffic as well as the pedestrians with speed and safety from accidents, numerous synchronized systems were devised and installed in various cities. Such systems have met with success and the trend appears to be toward this type of installation.

Syracuse, N. Y., the scene of the 1925 convention and exhibition of the American Foundrymen's association, recently installed a modern electrically controlled synchronized system which is being used successfully to regulate both vehicular and pedestrian traffic. This system should be of particular interest to visitors at the convention since it is the product of a local manufacturing establishment.

The Crouse-Hinds Co., Syracuse, has developed a control system during the past few years which has been placed in operation in a large number of cities. This system is based on the principle of displaying colored lights in a case which is suspended from cables at the center of the street intersection, or placed on iron posts at corners, the latter type being shown in Fig. 2. The system is so designed and installed that when a green light is displayed along the street, traffic moves, and at the same time traffic is stopped along intersecting streets by the display

FIG. 4—THE CUPOLA IS LOCATED AT THE FAR END OF THE SHORT BAY AND IS CONNECTED WITH THE REMAINDER OF THE PLANT WITH THE MONORAIL SYSTEM

of red lights. When a change in the direction of traffic is made, an amber light is shown for a few seconds, thus giving warning of the impending change. The system is controlled from a central point, in large cities the system being divided into districts and each district operated separately, according to the traffic demands in that zone, the control being either hand or automatic. The time given for the movement of traffic in either direction may be regulated as desired.

The traffic control system is only one of the many developments of the Crouse-Hinds Co. For 27 years this company has been engaged in the manufacture of a line of products used in connection with conduit installations, which simplify wiring problems, the product being used chiefly for wiring which is exposed along walls or ceilings. The products of this company are exceptionally diversified and cover many fields, the products made for railroad work alone being shown in Fig. 5. Each part has been designed to meet a specific requirement, and one may be had for practically every need.

Years of experience have shown this company that cast parts are more serviceable and at the same time last longer than those fabricated by other methods. The castings are made of soft gray iron for strength and to resist the action of acid fumes, gases and moisture. The latest addition to the line of products, namely the traffic signal system, is built from cast parts wherever possible, since the signal is exposed to extreme weather conditions and in many cases to destructive gases.

When the plant of the company was built near the city limts several years ago, a small foundry was erected, castings previously having been secured from jobbing shops. Increased demand has necessitated several additions. Railroad facilities for incoming and outgoing freight are supplied by the New York Central, the plant being located on the freight line of that railroad which is built one half way around the city. Sidetracks are located on the side and in the rear of the foundry building.

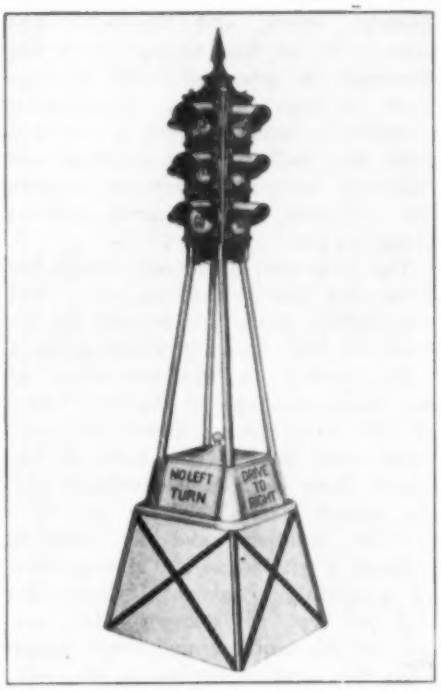


FIG. 6—AUTOMATIC TRAFFIC SIGNALS ARE USED OUTSIDE THE SIGNAL CONTROL AREA

Since much of the product of this company is used in some type of

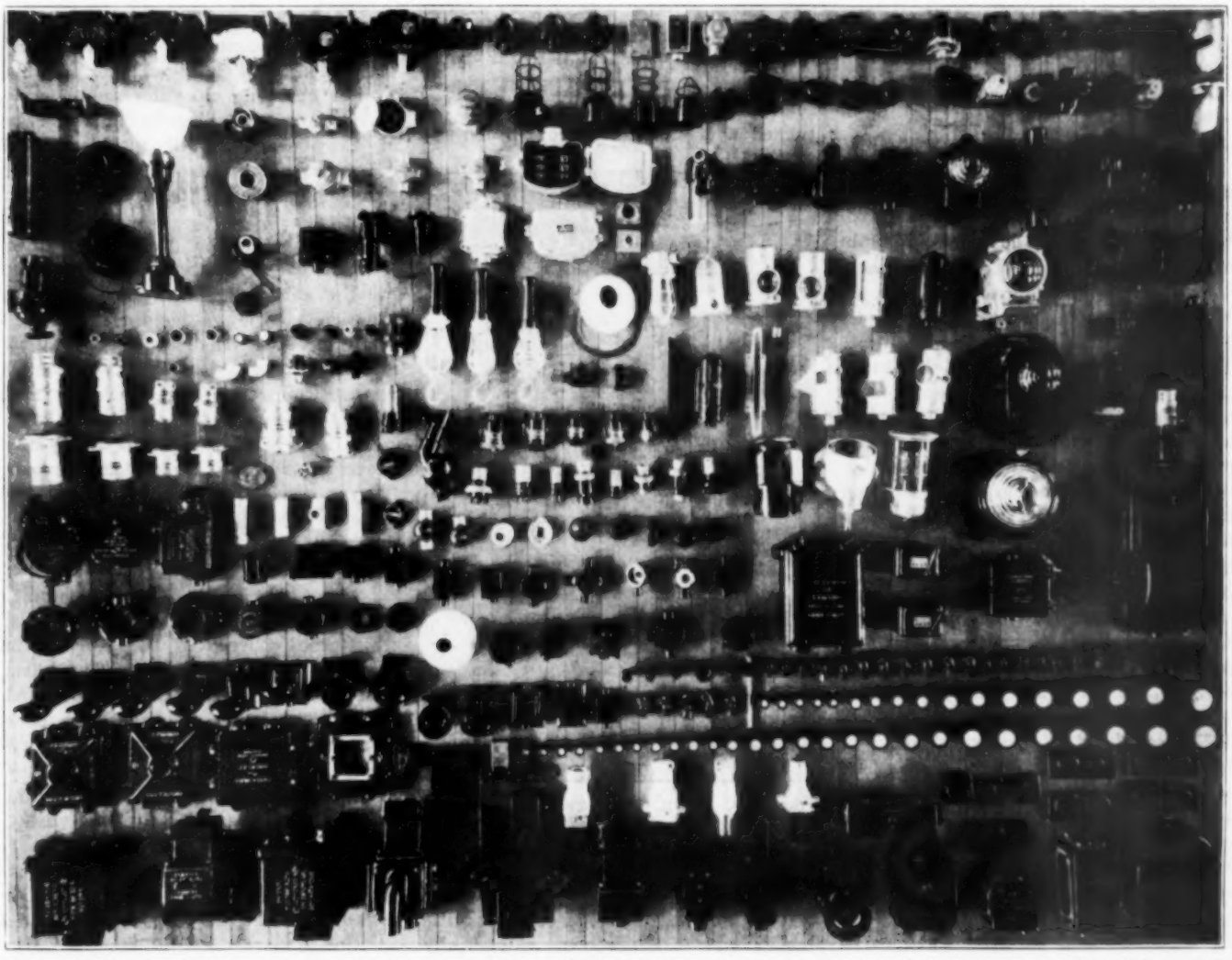


FIG. 5—LINE OF EQUIPMENT MANUFACTURED BY THE COMPANY WHICH IS USED EXCLUSIVELY FOR RAILROAD WORK. THE PRODUCT IS EXCEPTIONALLY DIVERSIFIED

electrical work, and therefore contains more or less wiring, cores are necessary in practically all castings made in this foundry. Exceptional accuracy in making cores is essential since the walls of the castings are relatively thin, and wherever possible the castings are threaded without being tapped.

The coreroom, ovenroom, where the cores are baked and inspected, and the mixing room are located in the front of the foundry building at a point nearest to the remainder of the plant, and extend the full width of the structure or about 120 feet. Bank sand used in the cores is unloaded from cars on the railway siding which extends along the side of the building, and is conveyed through a window to the mixing room by a portable conveyor. Core sand also is kept in storage piles outside of the building and when necessary the sand is hauled to the mixing room on electric trucks.

The sand and binder are blended in a mixer of the muller type manufactured by the National Engineering Co., Chicago, while special work is mixed in a machine made by the Blystone Mfg. Co., Cambridge Springs, Pa. After being mixed the sand is hauled to the corerom in wheelbarrows and placed on the bench or in the machines.

Two rows of core benches occupy the ends of the coreroom which is 20x100 feet, while 13 core machines, made by Wm. Demmler & Bros., Kewanee, Ill., are located in the center of the room. These machines, which operate at an air pressure of 100 pounds, make two small or medium size cores at the same time. The machines are operated by girls.

The cores are placed on plates and when the plates are filled, they are carried by the coremaker and placed in racks in the partition which separates the coreroom and the room in which the ovens are located. Gas-fired core ovens are used, made by the Oven Equipment & Mfg. Co., New Haven, Conn. The cores are taken from the racks where they were placed by the coremaker and placed in the oven and baked. After baking, the cores are placed on racks which form an L on two sides of the floor devoted to inspecting, and later are inspected by girls. The cores then are placed in large pans and stacked, later being taken to the molding floor on tramrail trucks. Pasting is done in one corner of the coreroom.

The molding floor is divided into three bays, each 60 feet wide. One bay is 140 feet long, while the remaining two are each 380 feet in length. The plant is exceptionally light and airy, and is heated in cold weather by steam pipes placed directly over the molders. A blower system is used to take the smoke and gases from the building. The floor of the foundry is brick, with a light layer of sand scattered over to prevent chipping of the brick when metal is spilled. An iron runway extends the length of each bay. A view of the center of the bay showing the arrangement of the plant is shown in Fig. 1.

Castings, ranging in size from one to 50 pounds, are made on a production basis. For this reason practically all of the work is done on molding machines, mainly of the squeezer type, made by the Tabor Mfg. Co., Philadelphia.

Those old timers of the days of 1908?

The machines are distributed along the sides of the bay, each molder having a floor of approximately 20 feet square. Metal patterns predominate, many patterns having a follow board. The drag is rammed up, turned over and the follow board removed and the cope rammed. The gate then is cut, much of this work being gated through the center of the mold, and the pattern rapped by inserting the rapping bar through the gate. Where matchplates are used, the vibrator is used in the draw. Snap flasks are used on the machine work, the flasks being stored in a room immediately back of the core ovens. The floor work is done at one end of the short bay, the castings molded here including signal boxes, tops and brackets for signalling systems, this type of casting being shown in Fig. 2, distributor boxes, etc.

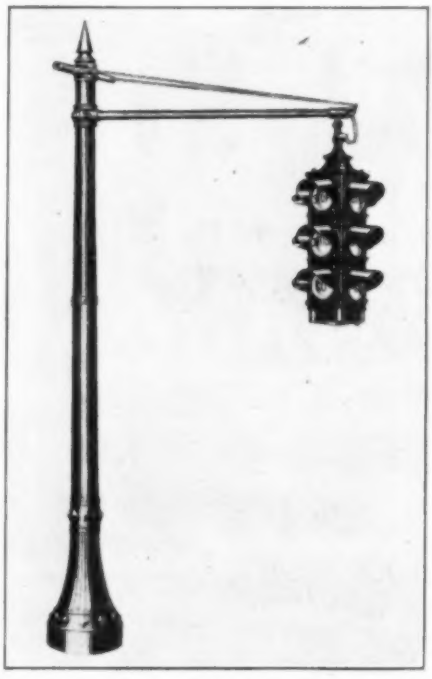


FIG. 7—A FOUR WAY TRAFFIC SIGNAL WITH MAST ARM SUSPENSION

A tramrail system extends the full length of each bay with trackage to the cupola at the end of the short bay. The cupola is lined to 72 inches, and was made by the Whiting Corp., Harvey, Ill. The metal is tapped from the cupola into ladles suspended from the tramrail. Laborers, who with the exception of pouring time, are employed hauling cores from the core department to the molding floor, and in the cleaning room, push the ladles to the various floors where the metal is poured into the hand ladles. Each large ladle serves approximately four molders. Each molder pours his own floor.

Pig iron, coke and limestone are unloaded from cars directly in the rear of the cupola and stored. The materials to be charged are elevated to the charging floor on an elevator which is loaded directly in the rear of the building. All pig iron and coke received are tested by the company chemist, and tests are run on each heat.

One long bay is divided into two sections, one part being used for the casting of nonferrous metals. The same type of molding machines used in the gray iron department are used here to mold the small work. Rollover, jolt, draw machines are used to mold the large case used in the signal system and shown in Fig. 7. This piece formerly was cast in three sections and bolted together, but now is cast in one piece. Two types of this particular casting are made, one having six holes for the light signals, three down each of the two sides, while the other has three holes in each of the four sides. The same pattern serves for both cope and drag. This case is made of both iron and aluminum, the aluminum being used where the signal is suspended from a cable, while the iron case is employed for systems using a post, as shown in Fig. 7.

Pit-type furnaces are used for melting brass while the aluminum is melted in a tilting type furnace made by the Monarch Engineering & Mfg.

(*Concluded on Page* 794)

PREPARING MICROPHOTOGRAPHS OF METALS

(*Continued From Data Sheet No. 590*)

(*b*) *When the Grains are not Equi-axed* (*e. g.*, in strained materials): Heyn's intercept method should be used, the average grain size being determined by counting the number of grains at a given magnification along a line of known length on two axes at right angles to each other, one axis being parallel to the direction of rolling. In some cases a third count along a line perpendicular to the other two may be desirable. This will necessitate the preparation of another polished surface.

NOTE

Jeffries' Method for Grain-Size Measurements.[2]

A circle 79.8 mm. in diameter is drawn on the rough side of a ground-glass screen, the center of the circle being near the center of the rectangular section of the screen. This ground glass is mounted in a frame which fits a metallographic camera, the smooth side of the glass being on the outside. When the image of the specimen for grain-size determination is focused on the screen, the circle will be plainly visible and its circumference should be well within the image.

When the image is properly focused the grains intersected by the circumference of the circle are checked and counted. Since the check marks must be made on the smooth side of the glass, a soft red pencil, such as is used in laboratories for marking beakers and flasks, will be found satisfactory. The marks used to indicate the boundary grains are usually short, straight lines intersecting the circumference of the circle and perpendicular to it. The completely included grains are next checked and counted, after which the red marks are erased from the glass with a dry cloth. The specimen can then be moved and other measurements made as desired.

One-half the number of grains intersected by the circumference of the circle, added to the number of completely included grains, gives the number of equivalent whole grains within the circle. If the equivalent number of whole grains within the circle measured at a certain magnification be multiplied by the number in the third column of Table I opposite the magnification used, the product will be the number of grains per square millimeter.

TABLE I

Grain Size Multipliers

Magnification Used (=*m*).	Diameter of Circle, mm.	Multiplier to Obtain Grains per Square Millimeter (=*f*).
Full size	79.8	.0002
10	"	0.02
25	"	0.125
50	"	0.5
75*a*	"	1.125
100	"	2.0
150	"	4.5
200	"	8.0
250	"	12.5
300	"	18.0
500	"	50.0
750	"	112.5
1000	"	200.0
1500	"	450.0
2000	"	800.0

*a*At 75 diameters, if a circle 84.5 mm. in diameter, or a rectangle having an area of 5625 sq. mm. is used, the factor *f* becomes unity.

[2]This method has been condensed from the paper by Zay Jeffries appearing in *Chemical and Metallurgical Engineering*, Vol. XVIII, p. 185 (1918).

(*Continued On Data Sheet No. 592*)

PREPARING MICROPHOTOGRAPHS OF METALS

(*Continued From Data Sheet No. 591*)

A circle 79.8 mm. diameter has an area of 5000 sq. mm. If it is desired to use a rectangle of the same area in place of a circle for the determination, convenient sizes are given as follows:

70.7	by	70.7	mm.
65	"	77	"
60	"	83.3	"
55	"	91	"
50	"	100	"

Since each of these rectangles has an area of about 5000 sq. mm., the multipliers given in Table I can be used for any one of them, or any other rectangle having an area of 5000 sq. mm. To make a grain-size determination with a rectangular in place of a circular area, the grains intersected by the periphery of the rectangle should be counted, one-half the number added to the completely included grains and the result will be the number of equivalent whole grains within the rectangle. If the determination is made at one of the magnifications given in Table I, the number of grains per square millimeter can be obtained by multiplying the equivalent number of whole grains within the area by the multiplier (*f*) opposite the magnification used. The rectangle could be used on a ground glass as described above for the circle, or it could be used on a micrograph.

Some metallographists prefer to refer to the grain size in terms of the diameter of the average grain in millimeters, or the area of the average grain in microns squared. The following simple formulas will be found helpful in these cases:

w = number of boundary grains;
z = number of completely included grains;
x = equivalent number of whole grains in 5000 sq. mm. (circle 79.8 mm. in diameter or rectangle having area of 5000 sq. mm.);
m = magnification used;
f = multiplier to obtain number of grains per square millimeter;
n = number of grains per square millimeter;
d = diameter of average grain in millimeters;
a = area of average grain in microns squared.

$$x = \tfrac{1}{2}w + z$$

$$f = \frac{m^2}{5000}$$

$$n = fx$$

$$d = \frac{1}{\sqrt{n}}$$

$$a = \frac{1{,}000{,}000}{n}$$

After considering various criticisms, owing to the fact that 75 diameters has become an established practice for use in illustrating the structure and grain size of wrought copper and the copper-zinc alloys, and that a large volume of work has been done using this magnification, it seems advisable to retain a magnification of 75 diameters for this class of material.

Numerical Expression of Grain Size

8. The grain size as determined by the planimetric method, Section 7 (*a*), should be expressed as the number of grains per unit area (square inch or square centimeter). This may also, but less preferably so, be expressed as the average grain area; or the average linear dimension of the grain may be given. The grain size as determined by the intercept method, Section 7 (*b*), should be expressed by giving the average number of grains per linear unit in the two directions; or the average number per unit area together with the ratio of length to breadth of grain (L/B) may be given.

(*Continued On Data Sheet No. 593*)

THE FOUNDRY DATA SHEET, OCT. 1, 1925

Payment will be made for all contributions on foundry and pattern shop practice suitable for publication

Note—This sheet may be cut into two sections, 5 x 7 inches, and may be readily bound in note book form.

Around the World with The Foundry

Little Journeys to the homes of our readers

Finland

DURING the short and intense Summer season communication with the outside world presents no unusual hazards; in the winter navigation is suspended altogether on account of an icy barrier from 6 to 12 feet thick; but in the seasons which correspond with the Spring and Fall in more southern Europe, vessels laden with lumber and lumber products, pitch, tar, pulp and paper, stagger across the storm-swept Baltic Sea and gain the North Sea either through the calm and peaceful ship canal at the base of the Jutland peninsula or fight and claw their way through a maze of islands and wild swirling tide races that make up the Kattegat of Denmark.

Great forests and immense granite quarries form the principal source of the nation's wealth and furnish employment for a considerable portion of its three million inhabitants. Modern, electrically driven saw mills, pulp and paper mills have been erected to take advantage of the water power available at various points in the vicinity of the canal, a triumph of engineering skill 36 miles in length, driven through the solid granite connecting Lake Saima with the Gulf of Finland.

A considerable quantity of castings in the shape of finished machinery is imported; but the local foundries are equipped to cope with the ordinary demands of the country's industries. THE FOUNDRY, the world's greatest authority on the methods involved in the production of castings is read by members of the executive staffs of the four principal shops in Finland.

"Wherever metals are cast you'll find THE FOUNDRY"

Hold Uniform Temperature *In Permanent Molds*

By Pat Dwyer

WITH few exceptions every foundryman at one time or another has toyed with the idea of a mold that might be used repeatedly. The instinctive feeling of conservatism and objection to waste in any form which characterizes the man whose prosperity depends on the margin he can maintain between his costs and his selling prices, rebelled against the practice of destroying an expensive mold after it had served its purpose only once. With the great majority of men the idea has been an idea and nothing more. Comparatively few have tried to put their thoughts into tangible form and an even smaller number have achieved any measure of success. The experimenters ran into so many varieties of metallurgical and mechanical trouble that they not only became discouraged, but the published result of their experiments prevented others from attempting any research work along this dangerous and expensive pathway. They preferred to remain on the old familiar highway, where if the rewards were not substantial, at least they were sure.

The foregoing is true particularly in reference to iron castings and to nonferrous castings into which the metal is poured at a comparatively high temperature. Adventurers in the white metal field where the pouring temparatures are low met with gratifying success in the development of the permanent mold and today a great quantity of white metal, lead, zinc and aluminum castings are made according to that process.

Two great fundamental problems prevented the adoption and application of the permanent mold as readily to the production of iron castings as to the production of castings in the so-called white metal class. One was the lack of suitable mold material and the second was the natural law which juggled the carbon in a highly disconcerting manner according to the temperature of the metal and the speed at which it was cooled.

The melting point of either cast iron, steel or bronze is approximately twice that of the nonferrous metal poured into molds made from these materials. If any metal was available as much more refractory than iron, as iron is to tin or zinc, the problem of developing a permanent mold in which to pour iron castings would be considerably simplified.

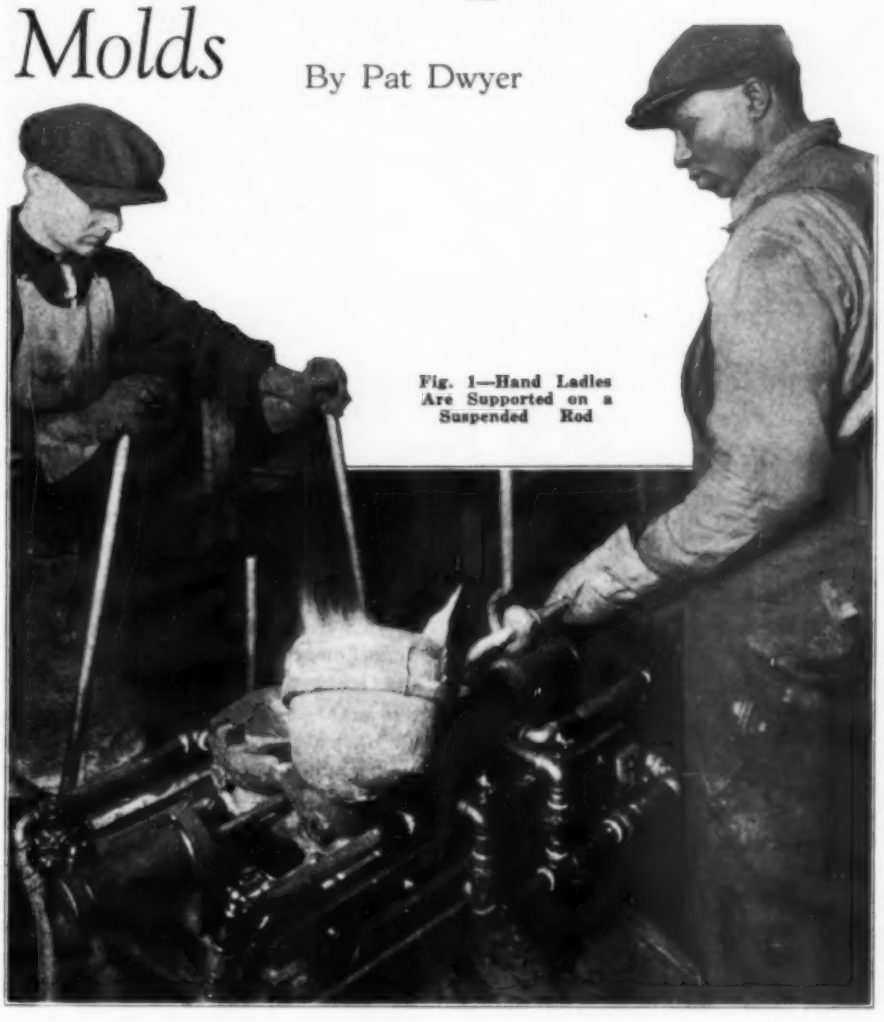


Fig. 1—Hand Ladles Are Supported on a Suspended Rod

More Extended Detail

IN FUTURE issues THE FOUNDRY *will present a series of articles dealing with this subject prepared by the inventor Harry A. Schwartz and covering intimate details in a manner outside the province or limitations of the present description. The articles will be supplemented and illustrated by a metallurgical report and series of micrographs prepared by Prof. Wm. Campbell, Columbia university New York. Mr. Schwartz has devoted five years to an intensive study and development of the permanent mold process and the forthcoming series of articles probably is most series of articles is most interesting.*

Behavior of iron in passing through successive stages between 2600 and 1400 degrees Fahr., has offered the greatest single obstacle to the development of the permanent mold. Several types of permanent molds have been tried, many of them theoretically and mechanically perfect, but through one reason and another few have survived. In justice, it must be admitted that in some cases outside factors entirely beyond the control of the inventor halted the progress, while in others the inventor abandoned his efforts when he found that the process was not a success commercially. Detailed descriptions of many types of permanent molds were published in former issues of THE FOUNDRY.

In the latest type of permanent mold the problem was attacked from a new angle and the machines that have been placed on the market by the American Foundry Equipment Co., New York, apparently are fulfilling every expectation. The process of which the mold is an impor-

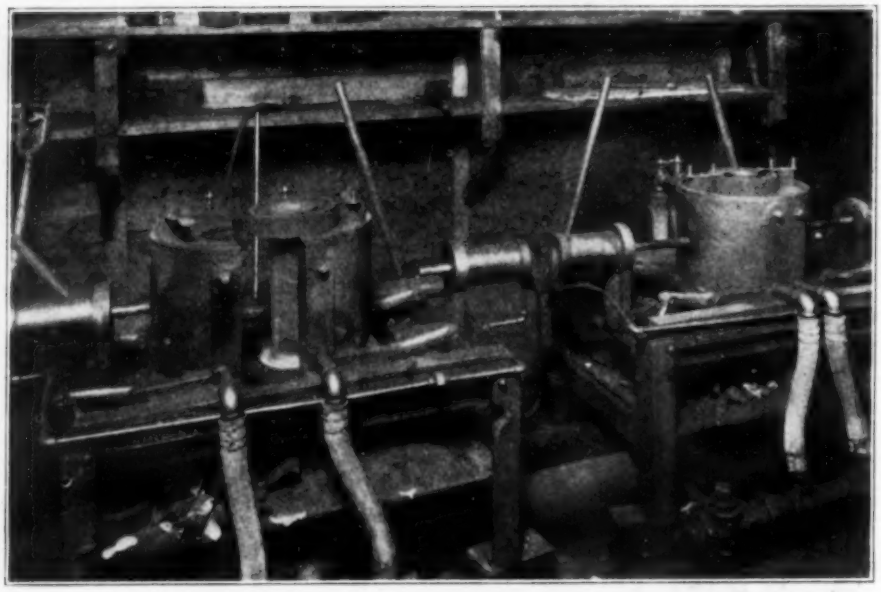


FIG. 2—THE MOLD AT THE LEFT IS SHOWN OPEN WITH THE CORES IN PLACE. THE MOLD ON THE RIGHT IS CLOSED AND HELD IN PLACE WITH THE PLUNGERS FROM TWO SMALL AIR CYLINDERS

tant part was developed in this instance by a mechanical engineer who was not hampered in his investigation by any former foundry training or tradition. He was perfectly free to form his own theories and draw his own conclusions from the mass of available literature that has been printed on the subject of permanent molds.

Although the process was developed to a point where the molds proved commercially successful nearly two years ago, still it was only recently that customers were sought who might be interested in installing the process in their foundries. This attitude of conservatism, a desire to subject every feature of the process to the merciless test of time has characterized the principals in the movement ever since the first survey was made nearly five years ago.

Preliminary Work

Approximately six months were spent by H. A. Schwartz, the inventor of the process, in securing first hand knowledge of all the work heretofore carried on by other men along this line. Drawings, descriptions, patent specification and several types of long life molds actually in operation were examined minutely. As a result of this examination he arrived at certain definite conclusions. He constructed a few molds and satisfied himself by a number of tests that his theories were correct. A number of prominent men including D. J. Ryan, Cleveland, became interested and for the past two years all the work has been conducted in the shops of the Allyne-Ryan Foundry Co., Cleveland, of which Mr. Ryan is president and active head.

Success of the present process is based on many factors but they all hinge on the fundamental fact that the mold must be maintained at a reasonably uniform temperature. Examination disclosed that deterioration of permanent molds was due not so much to high temperature as to excessive fluctuations and uneven distribution of mold temperature caused by the intermittent pouring of highly heated molten metal into the molds. Unless this fluctuation is prevented, the faces of the molds eventually develop a myriad of small cracks which destroy the usefulness of the molds. A more serious fault resulting from uncontrolled or widely fluctuating temperature is the well known tendency of cast iron to grow as a result of repeated heating above a certain temperature. This feature renders the mold inaccurate and consequently useless. Many of the molds at the Allyne-Ryan foundry have turned out lots of 25,000 castings and apparently are in as perfect condition as when they were new.

Castings cannot be produced commercially in cold iron molds. They cannot be produced in extremely hot molds on account of the tendency of the fluid metal to adhere to the face of the mold. Also, as stated previously, exceedingly hot molds soon deteriorate on account of cracking and growth. Water cannot be employed as a cooling medium because it vaporizes at 212 degrees Fahr. and that is too low a temperature to operate the molds successfully. The solution of the problem was found in using a fluid such as oil with a fairly heavy body and a flash point above 400 degrees as a cooling medium for the molds.

Oil Cooled Molds

Each mold is designed with the proper number of sections each with a hollow chamber adjoining the mold cavity and the oil is kept flowing through these chambers during the operating period. The extent of the cooling installation depends upon the character and number of molds to be served but a description of the equipment in use at the experiment station is typical and will serve for illustration.

The oil is stored in an elevated tank and is driven through the mains and various pipe connections by an electrically operated pump at a pressure of 20 pounds to the square inch. Three main lines connected to a header convey the oil to the three batteries of molds. Each mold is provided with suitable hose connections to allow freedom in opening the molds for the removal of the castings. The oil en-

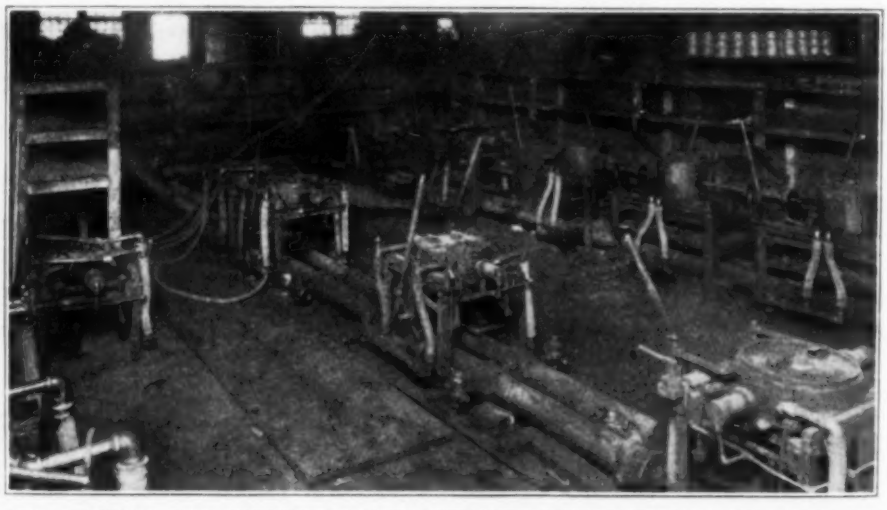


FIG. 3—MOLDS ARE ARRANGED IN TWO STRAIGHT LINE BATTERIES OVER THE OIL SUPPLY LINES. ANY ONE MAY BE DISCONNECTED AT WILL WITHOUT INTERFERING WITH THE OPERATION OF THE OTHERS

ters at one side and is discharged at the other side into a return main which conveys it back to a series of cooling chambers and thence to the storage tank.

Each of these cooling chambers, 15 inches in rectangular cross section and 5 feet in height, is equipped with a great number of vertical ⅝-inch brass tubes through which water constantly is circulating. The oil which fills the chamber is brought into intimate contact with the tubes and is cooled before it passes into the storage tank preparatory to re-entering the feed mains leading to the batteries of molds.

Other important features of the process include thermostatic control devices for automatically retarding or increasing the flow of oil to the molds and a somewhat similar device for indicating the proper instant for removing the casting from the mold.

FIG. 5—GROUP OF TYPICAL CASTINGS MADE BY THE PERMANENT MOLD PROCESS THE FORM CONTAINING THE GATE AND RUNNER FOR THE RADIATOR CASTING STILL IS IN PLACE

Mold Temperature

When molten metal is poured into a permanent mold, the immediate mold cavity surfaces do not take the molten metal temperature. The surfaces of the mold cavity are finished smoothly and show a well defined cellular structure when examined through a microscope. The harder constituents of the metal are distributed in a manner to form the cell boundaries. As a result of this distribution of the constituents the mold cavity surfaces possess more or less irregular contours with the harder constituents standing in relief in a cellular form above the softer matrix. The small recesses are filled with air or foreign substances which gasifies when the molten iron is introduced into the mold and serves as a protective film which is not broken down until after the molten metal has solidified, if at all.

Chill in cast iron is due to the too rapid cooling of metal from the molten stage to below the critical point, which in cast iron is about 1382 degrees Fahr. A proper portion of the carbon is not precipitated into its free state to form the structure that constitutes soft iron. The success of the permanent mold is based on the belief that carbon precipitation continues after the metal has solidified and only stops when the metal has reached the critical point. A rapid rate of cooling during this stage prevents a sufficient carbon precipitation while a slow rate of cooling promotes precipitation. Variations in the cast iron mixture promote or retard the rate of cooling and carbon precipitation and therefore promote or retard the tendency of iron to chill.

Permanent molds naturally are good conductors of heat and exert a rapid cooling action on the molten metal. To obtain soft, machinable castings from permanent molds it is necessary to remove the casting from the mold as soon as possible after it has solidified. The casting then can cool at a normal rate down to the critical point or at a sub-normal rate if it is buried in refractory material or enclosed in an air tight receptacle. Either of these courses will insure a proper carbon precipitation and soft, machinable castings. In cases where a thin surface chill is present when the casting is ejected from the mold, the hotter interior of the casting brings the surface temperature above the critical point and anneals the chilled skin.

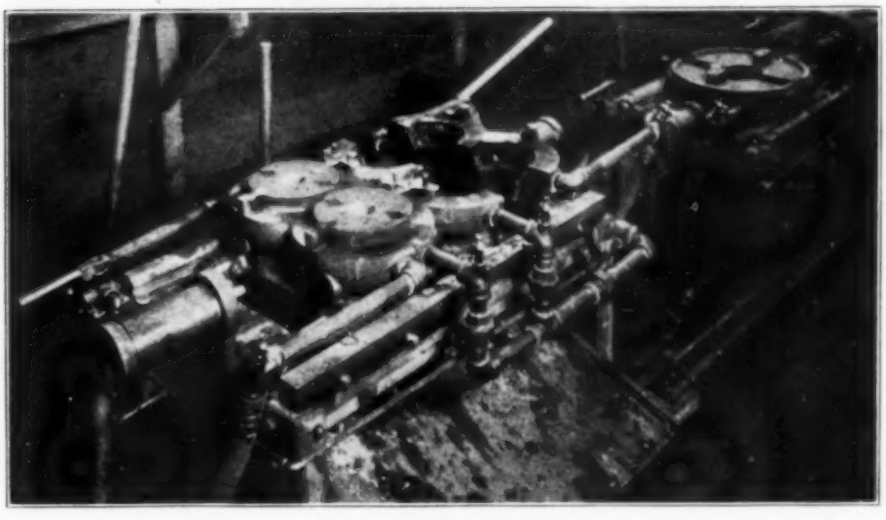


FIG. 4—INTERESTING EXAMPLE OF QUADRUPLE MOLD IN WHICH THE INSIDE SECTION IS STATIONARY WHILE THE TWO OUTSIDE SECTIONS ARE MOVABLE

Predetermined Temperatures

From the foregoing it is apparent that this process has taken into account several features either ignored or overlooked by others who have investigated the permanent mold problem. Further, and with these features in mind, measures are being perfected to insure a more uniform product. A predetermined temperature for the mold is established and means provided for maintaining this temperature within close limits. A suitable temperature for ejecting the casting also is determined and with these two principal features under positive control it is claimed that the production of castings in permanent molds is taken out of the hit or miss field and lined up with thousands of other routine processes that present no unusual hazard and require no unusual skill on the part of the operators.

The cooling fluid is circulated through the chamber surrounding the

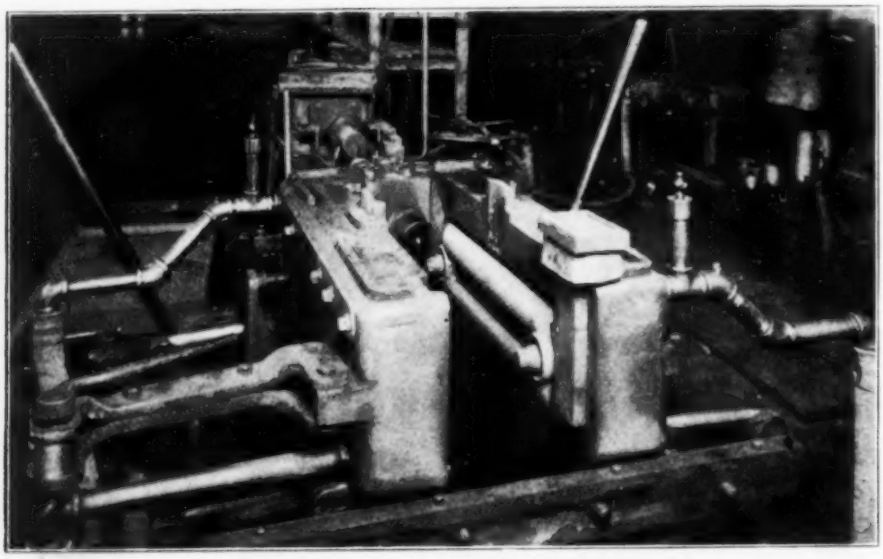


FIG. 6—OPEN MOLD FOR A RADIATOR SECTION WITH THE CORE AND RUNNER FORM IN PLACE. THE CORE REQUIRES NO CHAPLETS. IT IS HELD IN PLACE BY PRINTS ON BOTH SIDES

mold cavity in such a manner that whenever the mold temperature rises beyond a predetermined point the volume is increased to a maximum until the rising temperature is overcome. When the mold temperature falls below the predetermined point the volume of fluid either is decreased or cut off altogether. In other words, the fluid acts as a carrier for heat units. When the permanent mold temperature rises, more fluid is provided to carry off the increased number of heat units. When the mold temperature falls or ceases to rise, less fluid is provided to carry off the decreasing number of surplus heat units.

To insure a regulation both sensitive and prompt in stabilizing the mold temperature conditions, the fluid flow is controlled by a thermostatic device governed by the mold temperature. A thermostat bulb is located in the mold just below the mold cavity surface. At this point an extremely sensitive response is obtained to variation in mold temperature regardless of weight, shape or casting material. The bulb causes valve actuation in the fluid lines and automatically opens or closes them in prompt response to changes in mold temperatures.

Valve Action Slight

While pouring castings of light weight or thin section at short intervals of time, the effect on the established temperature range is slight. The input of heat units into the mold may not be of sufficient amount to cause the valve to open wide and, conversely, the lower temperature that obtains between pourings will cause the valves to close but slightly. The mold cavity walls separating the mold cavity from the fluid chamber are made as thin as practical limitations will allow.

In this process cognizance is taken of the fact that the temperature of the metal entering the mold is bound to vary from time to time during the progress of a heat due to operating conditions. For this reason the time element is not considered reliable in determining the stage at which the casting should be removed from the mold. It is claimed that the temperature of the casting is the only reliable index by which a uniform product may be obtained and therefore a thermostatic control is being perfected to insure the ejection of all similar castings at a uniform temperature. The thermal or electrical contact when the casting in the mold reaches a certain predetermined temperature, is actuated and either causes the registration of the proper ejection time or automatically initiates the ejection mechanism itself. In this way a run of castings is insured with substantially the same hardness and physical structure.

It is held that evils charged to phosphorus, sulphur and other elements in cast iron are not due to the presence of the elements in themselves, but to the manner in which segregation takes place in the structure of the casting. The molten metal by solidifying rapidly in the permanent mold forms a casting with a structure in which segregation has been minimized and one which has an exceedingly dense, fine grain. Where the newly formed casting is ejected from the mold shortly after it has solidified and where it is allowed to cool slowly past the critical point, the carbon in the cementite is precipitated in the free state and the resulting casting is soft and machinable.

Chilled Surface

Varying degrees of hardness may be obtained by allowing the castings to remain short or long periods in the molds. This feature presents an advantage in the production of castings subject to great wear or castings that require little or no machining.

(*Concluded on Page* 798)

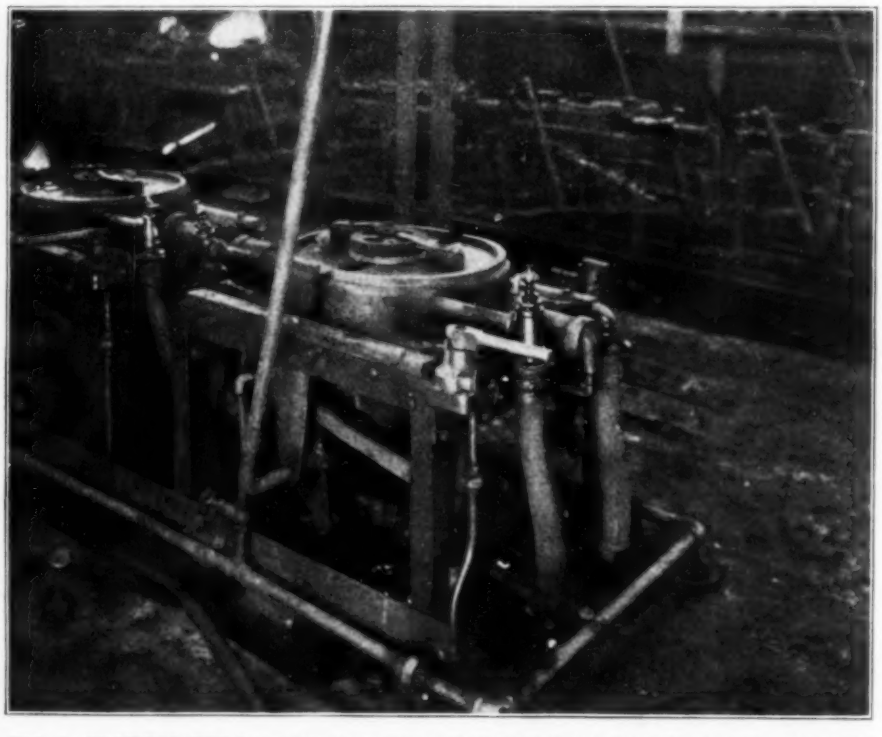


FIG. 7—SHOWING THE BACK OF ONE OF THE MOLDS WITH THE LEVER AND TOGGLE ARRANGEMENT BY WHICH THE HALF MOLDS ARE MOVED BACK AND FORTH

Casting Railroad Bearings—I

Manufacture of Car and Locomotive Bearings Is Important Industry Involving Production of Approximately 100,000 Tons Yearly

By G. H. Clamer

SOME idea of the magnitude of the railroad industry in the United States and Canada may be gathered from the following statistical enumeration of some of the principal features connected with the rolling stock. On class 1 and 2 railroads at present there are 2,588,260 freight cars; 137,711 company service cars; 70,000 passenger cars including Pullmans and 73,036 locomotives. The aggregate carrying capacity of the freight cars is 110,518,502 tons and the average capacity of a freight car is 42.7 tons, while the average tare of freight carrying cars is 47,500 pounds, or almost 24 tons. Most of the freight cars in service are rated at either 40 or 50 tons capacity. The former 30-ton cars are passing rapidly out of use. Their use has been found unprofitable.

Weight of the largest locomotive in working order is 853,050 pounds; weight on drivers is 761,600 pounds and the tractive effort is equivalent to 160,000 pounds. The average weight of a locomotive without tender is 103 tons and the average tractive power is 39,171 pounds.

Each locomotive carries about 1000 pounds of bearing metal. Each freight and passenger car is equipped with an average of 180 pounds, a total of 590,968,740 pounds for the combined needs of the rolling stock on class 1 and 2 railroads in the United States and Canada. Since the average period of service is a little less than 3 years it is apparent that 196,989,580 pounds of new castings are required annually for replacement.

Journal Bearing Scrap

Experience has indicated that from 70 to 85 per cent of worn out bearings are returned to the foundry in proportion to the tonnage of new bearings furnished. Locomotive bearing scrap returned to the foundry consists of worn out bearings and borings from the new bearings. The car journal bearing scrap returned consists of bronze journal bearing backs, and the lining metal, a lead base alloy.

Locomotive bearings are consigned to the scrap pile when they have worn down to certain prescribed dimensional limits. They also reach the scrap pile in the event of failure due to cracking or heating, or because the alloy exhibits insufficient compressive strength to resist the loads or shocks in service. They may be scrapped because the temperature of the bearing reaches abnormal limits due to irregularities of the service, lack of lubrication, grit particles, etc., or perhaps due to the inclusion of foreign matter in the bearing producing points of irritation. Bearings may fail also because of a combination of elevated temperatures and excessive loads or thrusts. Bearings frequently are replaced when the locomotive is sent to the repair shop for regular or special repairs. Under these conditions the bearings may not have served their complete period of usefulness, but it is considered economy to equip with new bearings upon such occasions.

Car journal bearings are consigned to the junk heap for one or more of the following reasons:

(1) Broken collar, (2) broken side lugs, (3) cracked bearing, (4) detached or loose lining, (5) heating in service (hot box), (6) worn down to the stipulated dimensional limits, or excessive end wear, (collar wear), (7) the car may be consigned to the shop for other repairs, such as change of wheels, and new bearings, supplied before they have served their full period of usefulness.

Journal Bearings

Bronze bearings are used exclusively in locomotive service. Some bearings are equipped with slots or pockets filled with white metal bearing alloy, usually of a tin base. The use of slotted or pocketed bearings is diminishing, as it has been found that better average results are obtained by using solid bronze bearings.

Where white bearing metal strips are used, it is good practice to have them extend the entire length of the bearing, otherwise uneven worn areas result and in time cause excessive heating of the journal.

Car journal bearings used in the United States and Canada are formed almost universally according to the design recommended by the American Railway association. These bearings are lined with white metal.

Design and various standard sizes

Continue the Series

G. H. Clamer, the author of this paper which on account of its length will be presented in THE FOUNDRY *in three installments, is a prominent figure in the nonferrous foundry industry. He is president of the Ajax Metal Co., Philadelphia, and was president of the American Foundrymen's association for the year 1924. Mr. Clamer was born in Philadelphia in 1877 and was graduated from the University of Pennsylvania in 1897. As a chemist he entered the employment of the Ajax company in that year and 20 years later became president. He also is president of the Ajax Electrothermic Corp. He is past president of the American Society for Testing Materials and is the recipient of the Elliott-Cresson gold medal for work done in connection with nonferrous foundry chemistry and metallography.*

He is particularly well qualified to discuss the subject which he has chosen for the American Foundrymen's association annual exchange paper presented in Paris, Oct. 5 before the meeting of the Association Technique de Fonderie de France. This exchange arrangement inaugurated in 1921 has done much to increase the interest in foundry problems and practices of other countries and has been the means of promoting international understanding among foundrymen. In all, eight papers have been contributed by representatives of the American Foundrymen's association before conventions of British and French foundrymen. Ten papers have been contributed to meetings of the American Foundrymen's association by members of the British Belgian and French associations.

recommended by the American Railway association are shown in Fig. 1. The smaller brass is for a journal 3¾ x 7 inches and weighs 10 pounds. The larger size is for a journal 6½ x 12 inches and weighs 44 pounds. The size most generally used in

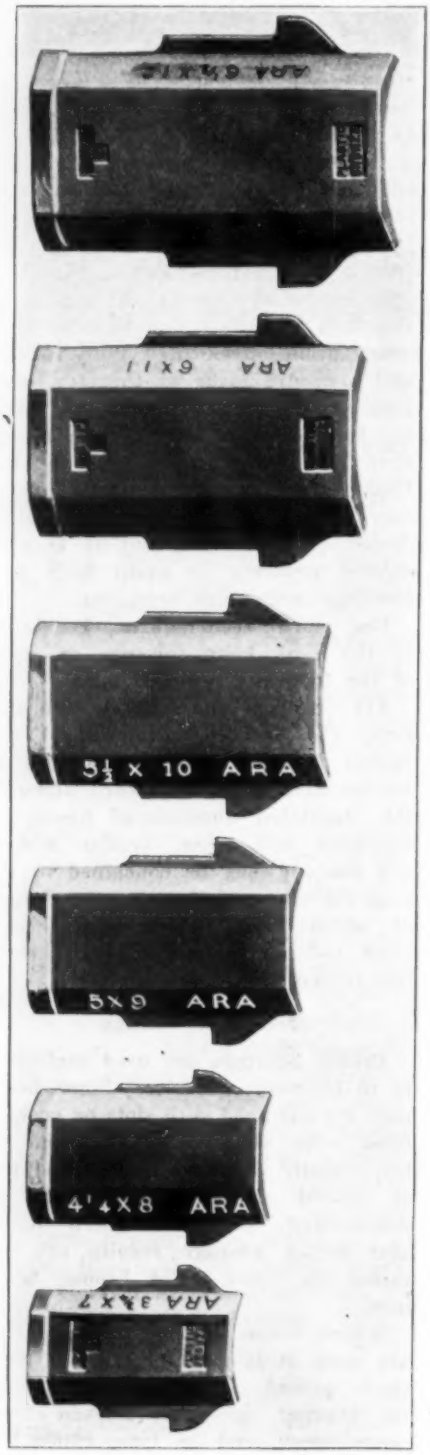


FIG. 1—STANDARD AMERICAN BEARINGS RANGING IN WEIGHT FROM 10 TO 44 POUNDS

freight car equipment and in the heavy passenger equipment is 5½ x 10 inches weighing approximately 25 pounds. Journal bearings, other than the standard designs of the American Railway association, are used on equipment of some of the independent railways, which do not operate in interstate traffic.

The majority of the freight cars are equipped with eight wheels. In special cases, twelve wheels are used per car, and in that event the size of the bearing is the same as the lighter capacity eight wheel car. Twelve wheels are common only to the heavier passenger car equipment.

The standard American Railway association bearing embraces a larger arc of the journal than is common with the bearings used on foreign equipment. The British bearing Fig. 2 although perhaps not operating under greater pressures per square inch, is relatively longer and narrower than the American standard bearing. Bearings embracing a shorter arc of the journal are lubricated more satisfactorily and in this respect to the author's mind the bearings on British railway equipment are more satisfactory. They may be operated without resorting to the use of white bearing metal linings.

White Metal Lining Alloys

Friction between the journal and soft white metal lining, particularly at low speeds, is greater than the friction between the journal and a solid bronze bearing. The use of the lined bearing in America has resulted from the necessity of eliminating to the greatest possible extent hot box troubles. The term *hot box* in America is used to describe an overheated journal bearing. Hot boxes are dangerous and may be a source of fire hazard, where wooden cars were

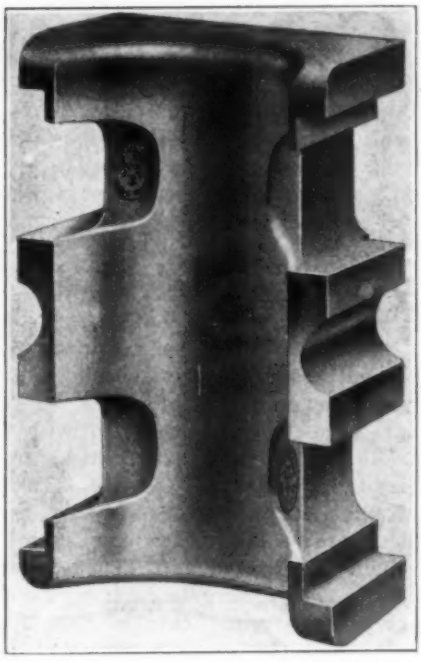


FIG. 2—TYPICAL BRITISH JOURNAL BEARING

used. A hot box also may cause axle failure, and in this respect is dangerous. The main complaint arises due to the delay occasioned in travel, necessitated by either the correction of the cause of the trouble if it is lack of lubrication, or removal of the bearing if found unfit for further service.

Lining of journal bearings has been the most important factor in the reduction of the number of hot boxes. Better lubrication and efficient dust guards in the journal bearing boxes, and more careful supervision, are other important factors. Today in the operation of cars on American

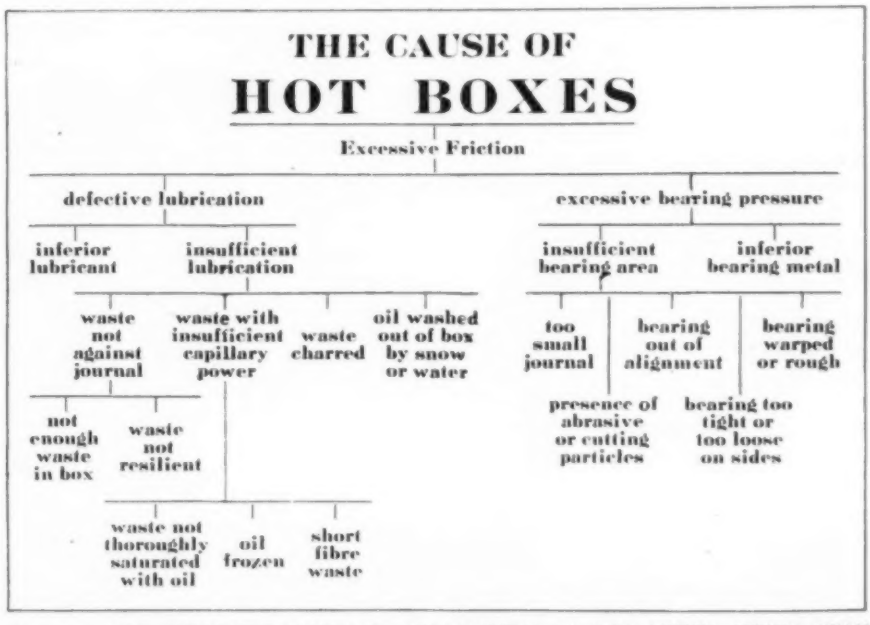


FIG. 3—CHART INDICATES MANY OF THE CAUSES OF HOT BOXES OTHER THAN DEFECTIVE CASTINGS

Table I

Results of Friction Test on Copper and Tin and Copper-Tin-Lead Series

	Copper	Tin	Lead	Friction	Temperature above room	Wear in grains
1	85.76	14.90	.....	13	50	0.2800
2	90.67	9.45	.....	13	51	0.1768
3	95.01	4.95	.....	16	52	0.0776
4	90.82	4.62	4.82	14	53	0.0542
5	85.12	4.64	10.64	18½	56	0.0380
6	81.27	5.17	14.14	18½	58	0.0327
7	75.?	5.?	20.?	18½	58	0.0277
8	68.71	5.24	26.67	18	58	0.0204
9	64.34	4.70	31.22	18	64	0.0130

railways, hot boxes rarely develop. Unfortunately, this result is accomplished at the sacrifice of thousands of tons of coal per annum consumed in overcoming the additional friction imposed by the use of the lined bearings as compared with the solid bronze bearings.

The alloy used in America for lining metal for car journal bearings, has a lead base and is relatively soft. The two principal alloys used for linings are made up as follows: (1) 87 per cent lead, 13 per cent antimony, approximately the eutectic alloy. (2) 85 per cent lead, 10 per cent antimony, 5 per cent tin.

These alloys are used if the lining is ¼ inch to ⅜ inch in thickness. For linings less than ¼ inch thickness, softer alloys are used, for example, 90 per cent or over of lead, 3 to 10 per cent of antimony, and tin if present, from 1 to 3 per cent. All these alloys are quite soft compared with the bronze used in the journal bearing back and constitute a means whereby the bearing, so to speak, becomes self fitting. Such linings adapt themselves to the diameter of the journal and to any irregularities in conforming to the surface of the bearing. A solid bronze bearing must be fitted carefully to the journal and when placed in service can conform only to the dimensions of the journal by a process of wearing. This is naturally a slow process and frequently hazardous, as an undue pressure may result on the crown of the bearing, interfering with the oil film and thereby start heating.

Many of the European bearings are not only narrower than the American bearings, but they are more carefully machined and fitted, thus making it possible to maintain a heavier oil film. Lubricating oil like a rubber band, is capable of extension only to a certain degree before it will break or become so thin that it is no longer useful in holding apart the bearing and the journal surfaces. Where the film of oil is distended over a long arc, as in American practice, it may break or become too thin and cause an overheated journal bearing.

Friction And Wear Testing

Some years ago the author determined the rate of wear on narrow strips of metal on a Carpenter machine shown in Fig. 4 and built by Tinius Olson & Co., Philadelphia. The machine consists of a journal *A*, which revolves on the large cast-iron wheel *B* and held in position by the bearings *C*, *C*', *C*². The object of the wheel *B*, revolving on the bearings *D* and *D*', is to take the pressure and thus relieve the bearings *C*, *C*', *C*², which otherwise would become heated and cause erroneous readings. The test bearing *E* is held in contact with the journal by the ball-and-socket joint *F*—the socket being on the bearon the bearing, and the ball on the adjustment screw supported in the knife edge level *G* and *G*'. The load is applied to the bearing by the spring *H*, which pulls downward on knife edge *I*, and this in turn on the knife edges *J* and *J*', and these against smaller springs *K* and *K*'. The pressure is recorded in pounds. The speed indicator and counter records the number of revolutions. The arm attached to lever *G*, by the screw operated weight *L*, indicates the friction in pounds, or in other words balances the pull due to friction. A thermometer is placed in the hole in the bearing to record the temperature. This machine is compact and has been found quite satisfactory.

Method Of Testing

Securing results of any value was impossible while using the full size bearing with which the machine originally was equipped. This bearing embraced roughly 20 per cent of the surface of the journal when the bearing was worn down to a perfect fit. The original bearing was slotted and test pieces ½ inch wide were inserted in the slots. The test pieces while held in place by set screws, were machined carefully to the diameter of the journal. Attempts first were made to machine the test pieces in a manner to give them the smoothest possible surface and then to fit them to the journal by scraping. The bearings then were placed on the machine and the machine was run until the test pieces were satisfactorily fitted. They were taken out and wiped as carefully as possible to free them of oil and then placed in ether to remove the impregnated oil. The pieces then were dried and weighed and placed back on the machine. The machine was run to 100,000 revolu-

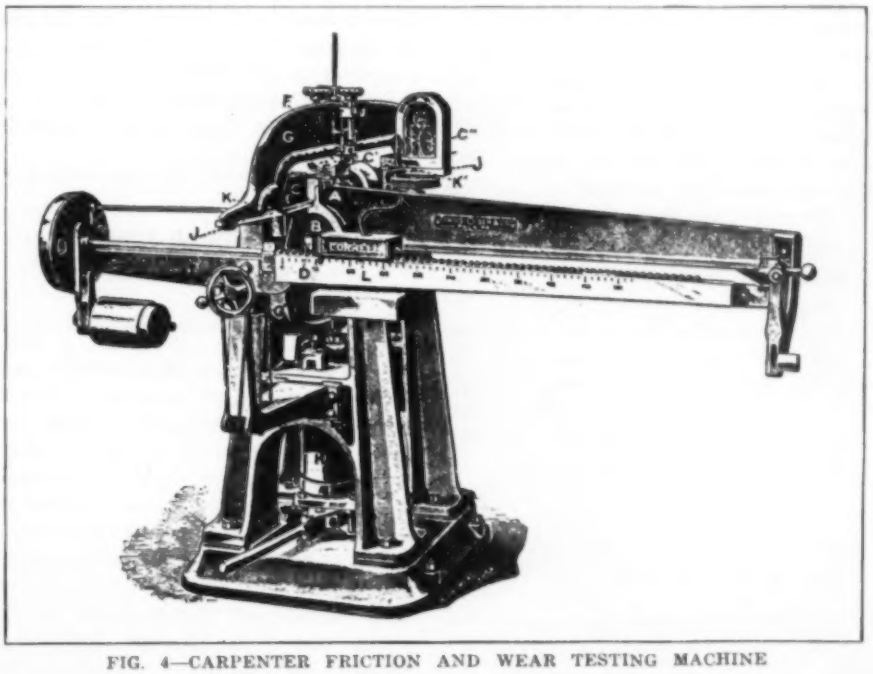


FIG. 4—CARPENTER FRICTION AND WEAR TESTING MACHINE

Table II

Result of Friction Test on Copper-Tin-Zinc Series

	Copper	Tin	Lead	Zinc	Friction	Temperature Above room	Wear in grains
5	85.12	4.65	10.64	.....	18½	56	0.0380
10	83.27	5.28	10.25	2.07	18½	68	0.0415
11	79.84	4.71	10.30	5.44	18¼	66	0.0466
12	66.38	5.62	11.42	6.54	18½	68	0.0472
13	74.28	4.68	10.51	11.04	18½	69	0.0846

tions when the test pieces again were removed and dried in the same manner to remove the oil, and again weighed. A number of tests of this nature were made on the test pieces with each alloy to obtain the figures given in Table I and Table II.

Table I covers a series of copper-tin and copper-tin-lead alloys without zinc, and Table II shows results with alloys containing zinc.

The method of lubrication was the same as used in American practice for the lubrication of car journal bearings. A sufficient amount of woolen waste was packed beneath the journal in an oil well in such a manner that it gave the bearing the equivalent of flooded lubrication. The bearing in effect revolved on its under side in a pool of oil, and the waste acted as a blotter to distribute the oil film and to wipe off the grit particles.

Notwithstanding the flooded method of lubrication used and the presumption that under such lubrication the journal bearing and the test pieces were not in actual contact, but at all times separated by an oil film, there was distinct evidence that the coefficient of friction of the harder metal alloys was less than that of the softer alloys. The rate of wear, was greater on the harder alloys than on the softer alloys, thus confirming the conclusions reached by Dudley[1] as a result of long time service tests. This confirms also the conclusions reached by Charpy[2] on tests made with a small laboratory machine.

Because of the impossibility of maintaining absolute control over all the conditions involved in performing these tests, the author does not wish to present them as being absolutely correct, but he is of the opinion that they are sufficiently reliable to warrant the following conclusions:

(1) Rate of wear within the limits of the range of alloys tested, decreases with decrease of tin content and increase in lead content. (2) The coefficient of friction within the range of the alloys tested increases with the diminishing hardness of the alloy. (3) The introduction of zinc in the copper-tin-lead alloys, probably due to the hardening effect of that element, increases the rate of wear.

The alloys tested were of the general class known as copper base in which copper is the predominating constituent. It is well known that copper and lead, except to limited extent, do not alloy. In the liquid state there is sufficient evidence to indicate that there is an actual solution of lead in copper, but in the solidified form to a large extent the metal exists as a mere mechanical mixture. Both copper and lead are relatively soft metals. Tin and zinc are hardening constituents. Tin has a greater hardening influence than zinc. When tin and zinc are both present in an alloy of copper, or copper plus lead, the hardening effect of these two constituents is multiplied.

1—Journal of The Franklin Institute.
2—*Travaux de la Commission des Alliages.* Bulletin Societe d' Encouragement pour 'l' Industrie Nationale, June, 1898.

Urges Cooperation

Speaking on the need of the foundry industry before the New England Foundrymen's association recently, Robert Crawford, president of the Atlas Foundry Co., Detroit, stated that co-operation between foundries was the chief feature desired. He told of a foundry in the Detroit district which was in financial trouble and went to a group of competitive foundries for assistance. This help was given in the form of a comprehensive study of costs, the trouble eventually being found and the foundry placed on a paying basis. He described conditions in various automobile foundries, and stated that much dead timber had been carried by these shops in the past. He told of one automobile foundry which, until recently, was forced to place business with 25 outside foundries, but through a change in operating organization now is producing all of the castings desired.

Mr. Crawford stated that the foundry should be considered as one department of the manufacturing establishment and not as a separate unit to be kept as far away from the main plant as possible. He told of the Ford plant, which has no partition between the foundry and machine shop.

Did you send in your list?
If so, send another

Traffic Signal Systems Use Many Castings

(*Concluded from Page* 786)

Co., Baltimore. The posts are lifted from the furnaces by an electric crane made by the American Engineering Co., Philadelphia. The furnaces are gas fired. pressure being supplied by a blower made by the Spencer Turbine Co., Hartford, Conn.

The castings are shaken out by the night crew and hauled on the tramrail cars to the cleaning room located at the far end of the two long bays. The night crew also cleans up the molding floors and tempers the sand, a sand cutting machine made by the American Foundry Equipment Co., New York, being used.

All castings are sandblasted or tumbled, the castings poured one day being cleaned and sent to the cleaning room the following day. A sandblast room is used on the biggest work.

The center of the cleaning room, which is 100x120 feet, is occupied by sandblast barrels made by the New Haven Sandblast Co., and tumbling .barrels installed by the W. W. Sly Mfg. Co., Cleveland. A special machine is used to break up the cores and to separate nails and wires. Grinders are located along one end of the room and large grinders are placed along one side, the machines being made by the Egan Electric Co., Watertown, N. Y. After the castings have been cleaned, they are inspected, weighed on a scale manufactured by the Toledo Scale Co., Toledo, and then hauled on electric trucks to the finishing department in another part of the factory.

The Capitol Foundry Co., 502 South Fifteenth street, Phoenix, Arizona, recently has been opened to make iron castings. Edward C. Voss is president and E. A. Spring is secretary-treasurer.

How and Why in Brass Founding

By Charles Vickers

Rosin Used as a Flux

We purchase considerable quantities of a lead-base metal of the following composition: Lead 80 per cent, antimony 14 per cent, tin 6 per cent, and as we operate a brass foundry we have thought of making the alloy ourselves instead of buying it. The ingot we purchased is melted in a small oil-fired furnace and the metal is poured into short pieces of steel pipe, scored to retain the antifriction metal. These form bearings which are then reamed out, a process responsible for considerable quantities of borings. We plan to purchase the constituent metals of the bearing alloy and to melt them in plumbago crucibles in the brass furnaces, and work off our accumulation of borings. We would like to know what flux should be used in the process.

Rosin is the flux which will detach the entangled metal from the dross. No difficulty should be experienced in making such bearing metal. About the best plan is melt a bath of lead, getting it to a red heat and then dissolve the antimony in this bath. Then the balance of the lead, with the tin can be added.

The borings may be added to the molten mixture of new metals when the latter is hot enough to burn a piece of wood thrust into it. After the borings have been dissolved a little common rosin may be sprinkled over the surface of the metal and rabbled with an iron skimmer.

It is a simple alloy to make, but in using crucibles it must be watched not to get too much heat, which would do the alloy no good, and is quite unnecessary.

Change Style of Gates

We have experienced considerable trouble in making a bearing in the shape of a small bushing which has a ribbed flange on one end necessitating casting in the vertical position. A core ⅞-inch diameter is cast in the bushing part and when the castings are poured hot, the bearing comes porous on top and along the core, and when poured cool the flange develops leaks. The composition is 88-10-10 with 2 ounces of phosphor copper added per 100 pounds of metal, and we use nothing but virgin copper.

We presume that when poured hot the castings fail to develop the leaks noted but the difficulty of porosity develops instead. We note that no porosity shows on turned surfaces cast in contact with the green sand of the mold. It appears as though the cores were at fault mainly. Evidently they are too hard for the metal to lie on, and a change should be made in binder. If an oil binder is being used now, it would be a change to use a dextrin binder, or a rosin binder. The proportion of sharp sand in the core mixture also should be increased. The shape and position of the gas holes indicates they were formed as the result of a bubbling around the core and are not due to gas held by the metal. The porosity that comes with cool pouring is due to the gate, which solidifies before the casting and the heavy bushing part, being lower, draws the eutectic of the metal from between the crystals at the point where leaks develop. Instead of gating into the edge of the flange, cut the gate into the cope surface and make it slope sharply into a heavy section like a shrink ball in the cope, with the idea of making the casting solidify before the gate.

Castings Are Cleaned Before Dipping

Will you please advise the proper acid dip on sample castings we are sending you to be used after they have been cleaned i nthe tumbling barrel. It is our impression that an acid dip is necessary after tumbling to give the proper appearance. The one sample casting sent you shows the finished appearance we would like to have and the other shows the casting as it comes from the foundry.

After the castings have been tumbled they must be cleaned of all grease. This is done by washing in water to which common lye has been added, preferably maintained hot. From the lye the castings are placed in a tank of water to rinse off the lye before being dipped in the acid solution. It is important to remove the lye, since it would kill the acid making it necessary to renew the dip more frequently than otherwise would be necessary, thus adding to the cost of the operation. The dip consists of 2 gallons of sulphuric acid, 1 gallon of commercial nitric acid and 2 ounces of common salt. The acids should be kept in a large crock and the nitric acid should be poured gently into the sulphuric acid. The dip should be in a well ventilated place when in use, or preferably under a hood with a strong draft. The castings are dipped for about one second, and from the dip they are well washed in cold water. They are dipped into a cyanide solution to remove stains from which they go into cold water, then into hot water, and finally are dried in hot sawdust. The cyanide dip is intensely poisonous and consists of a solution of 1½ pounds potassium cyanide to 20 gallons water. Should there be much of this dipping work to be done, it would be advisable to employ a professional plater and give him the equipment.

Crucible Bottom Sticks

We have installed a gas-fired crucible furnace for melting brass, but experience much trouble due to the pot sticking to its stool which is made of fire bricks. Sometimes we pull off part of the bottom of the crucible, which seems to shorten its life. In our coke-fired furnace we got from 60 to 65 heats out of the crucibles, but from the gas furnace we only get 21 heats from the same kind of pots.

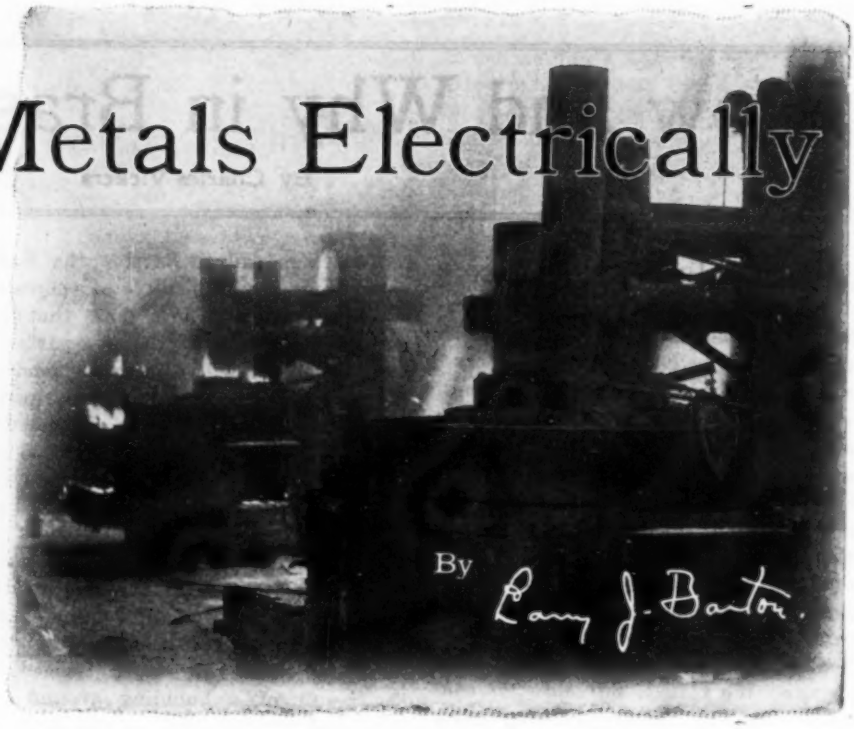
A little fine charcoal often acts as a parting between stool and crucible, but finely-powdered anthracite coal is better. It is doubtful whether any parting material will be of value as it is evident the burner is not set in the furnace to good advantage. The base of the crucible must *freeze*, otherwise the pot would never stick so strongly as to tear the crucible bottom. However, it is not to be expected they will last as long as in the coke-fired furnace.

Have the burner so located that the flame strikes at a tangent to the inside of the furnace and so whirls around the crucible to emerge through a hole in the cover 6 inches in diameter. Place the burner so that it points at the base under the crucible, and use a round base obtainable from the crucible makers. Do not use common firebricks transposed. Locate the burner about 2 inches away from the furnace casing, and have the hole through casing large enough for all the flame to pass into the furnace.

Refining Metals Electrically

Chapter IX (Concluded)

Gives Costs of Acid and Basic Melting



THE cost data in table LXIV covers the operation of a three-ton furnace made by the Pittsburgh Electric Furnace Corp., Pittsburgh, operating on the acid hearth, making small sized steel castings. The figures given cover the operation for the month of October 1920. The conditions cover the production of approximately 600 tons of steel, and the furnace averages about 7½, three-ton heats per day of 12 hours.

Further figures from the same shop covering the cost per ton over a six months run are as follows:

Metals	$19.77
Electrodes	1.53
Power	10.36
Miscellaneous	0.25
Labor	3.35
Repairs	1.27
	$36.53

From THE FOUNDRY of April 15, 1921.

Another acid furnace shop operating near Pittsburgh on a three-ton unit of the same type shows a melt cost over several months operation of $35.20 per ton of metal in the ladle. This figure was taken from the operation during a 16-hour period, making small to medium size castings mainly for railroad use.

Costs In Southern Shop

The data in Table LXV covers the operation of a three-ton furnace from January 1923 to December 1924. This furnace made small to medium size castings, principally for railroad car construction. The average number of gates poured per heat was 45, so that it may be seen that the metal was heated to a rather high temperature. The practice was of high degree as the losses were kept to a minimum.

The costs have been segregated according to the tonnages melted for the various months. The average cost was close to that shown under 300 tons.

The general overhead, including all fixed charges and supervision, ran from $30.80 a ton of finished castings on the basis of 200 tons charged, down to $20.25 for 300 tons, and $15.40 for 400 tons. The return in cleaned castings was slightly over 65 per cent of the metal charged. When all these figures are totaled on the basis of finished work, the difference of tonnage is much more apparent. The costs for the steel in the completed casting are $87.60 per ton for 200 tons; $70.15 for 300 tons; and $62.10 for 400 tons.

Costs Of Electric Furnace Iron

The following cost data cover the results made by the author on the manufacture of synthetic pig iron. The figures are those obtained on the Pacific coast during 1921. A six-ton acid lined furnace was used, and poured 45 tons per daily run. The figures follow:

	Per net ton
Labor	$ 0.666
Power 525 kilowatt @1c	5.250
Electrodes 20 pounds	1.600
Repairs	0.500
Recarbonizer	0.300
Alloys: Manganese 0.50%	
Silicon 2.00%	4.000
Scrap: Borings at $5.00 per ton, 3% loss	5.150
	$17.7160
Miscellaneous at 10%	1.7716
Total	$19.4876

The pig iron made was standard foundry iron to be used for castings requiring little machining, or none at all.

Basic Synthetic Iron

Actual costs taken from the operation of a six-ton basic furnace making special pig iron from steel scrap are given in Table LXVI. The iron was intended for use in a cupola making medium hard castings. The output was 36 tons per day.

In these particular costs the labor is far too high, and the cost of metal is exceedingly low. Considering these items and such points as loss in melting, handling and floor materials, the cost would probably be closer to $20 per net ton. As pig iron at this particular time cost $45 per net ton there was quite a saving made by this operation.

In Table LXVI, seven figures for labor are taken from a shop that produced synthetic iron at a rate of 30 tons per day.

Costs using 3-ton furnace made by the Ludlum Electric Furnace Corp., Watervliet, N. Y., for making iron for machined castings are as follows:

Item	Cost per ton
Power: 575 kilowatt hour @2c	$11.50
Electrodes: 10 pounds @25c	2.50

Relative Costs

COSTS are of relative value at any time and depend on the number of variables. The cost for one operation may be higher in one place than another and to interpret costs all the factors must be considered that intelligent use may be made of them. The author has given costs of electrically melted metals both steel and iron under varying conditions and different localities. By substituting present prices and conditions for those presented, a close approximation for electric furnace operation may be obtained.

This is the concluding installment of Mr. Barton's series. These articles are being arranged and will be published in book form in the near future.

TABLE LXIV

Cost of Electrically Melted Steel Produced on Acid Hearth

Material charged	Pounds	Price per ton	Total cost
Clippings	234,301	$28.23	$ 2,952.66
Heavy drop forge	167,247	28.95	2,161.50
Turnings	207,897	18.00	1,673.57
Shop scrap	561,796	25.06	6,284.81
Spiegel 40 per cent	24,324	67.50	732.88
Silicon 50 per cent	5,495	85.00	208.48
Iron ore	2,760	9.11	11.22
Aluminum	60	0.338c lb.	20.28
Total	1,203,880		$14,045.40
Average per net ton			$24.55

Cost per ton of metal in ladle

Metals	$24.55
Electrodes	0.77
Power	12.03
Miscellaneous	0.34
Labor	2.40
Repairs	0.75
	$40.84

TABLE LXV

Cost per Ton Decreases with Increase of Metal Melted

Item	Metal charged 300 tons	300 tons	400 tons
Labor	$ 2.18	$ 1.73	$ 1.52
Power	15.00	11.50	10.25
Electrodes	1.20	1.02	0.84
Refractories	0.60	0.45	0.30
Tools, water	0.25	0.20	0.15
Ladles	0.25	0.25	0.25
Alloys	1.23	1.23	1.23
Miscellaneous	1.00	0.80	0.60
Metal	18.90	18.90	18.90
Total	$40.61	$36.08	$34.04

Note the drop in the costs of conversion as the tonnage increases, from $20.48 for 200 tons; to $15.95 for 300 tons; and to $13.91 for 400 tons.

Ferrosilicon: 30 pounds @4c	1.20
Coke: Refuse from cupola size	0.75
Slag materials: lime, sand, spar and carbon dust	0.50
Cooling water and tools:	0.15
Refractories:	1.00
Labor: Melter @$9.00 day	
Laborers @$3.12	2.50
Yard labor and charging:	0.50
Direct supervision: 50% of labor	1.50
Fixed charges:	2.52
	$24.62

This cost per ton is the total less the cost of metal, which figuring cast iron scrap at $18 with a 5 per cent loss, would bring the total cost up to $43.52 with an actual cost of conversion of $14.25 per ton. These figures were obtained on the basic furnaces operating three heats or nine tons per day, the product being a high grade, low sulphur iron, capable of being used for any purpose.

R. C. Gosrow gave figures in Table LXVIII. They are taken from THE FOUNDRY of March 15, 1921, and relate to the cost of synthetic gray iron.

In the same article the cost of producing the same grade of iron from steel by building up the carbon and silicon is given. The outstanding feature is the difference in costs of the metals charged. The cost of steel being less than half of that for scrap iron. These figures are as follows:

Cost of electrically melted gray iron produced from steel

	Cost per net ton
Steel turnings Shear scrap Forge flashings Stamping scrap averaging $19.00 @ 10% loss	$20.90
Fluxes, etc.	0.20
Carburizer (gas carbon)	0.70
Spiegel 45 pounds at 1.75c pound	0.70
Ferrosilicon 85 pounds ton	3.80
Power 450 kilowatt hours at 1½c	6.75
Electrodes 15 pounds graphite	3.45
Linings	0.40
Lining repairs	0.40
Ladle repairs	0.20
Ladle heating	0.25
Furnace tools	0.25
Labor, chargeable to furnace and production	3.85
Fixed charge	1.00
	$42.85

From the foregoing data on actual costs some idea may be obtained of the differences due to varying conditions, and while they can be of no direct value, the figures given may be changed to accord with present

TABLE LXVI

Cost of Synthetic Pig Iron Produced on the Basic Hearth

Item	Cost per day	Cost per net ton
Labor:		
3 melters @ 85c	$20.40	
3 first helpers @ 81c	19.44	
3 helpers @ 67c	16.08	
3 cranemen @ 81c	19.44	
3 ladlemen @ 77c	18.18	
3 floormen @ 67c	16.08	
6 laborers @ 62c	29.76	
	$139.38	$ 3.871
Power: 18000 kilowatt hours @ 1c	$180.00	$ 5.000
Repairs and renewals: Brick, electrodes, patching	$121.20	$ 3.370
Alloys:		
Manganese @ 1.00 per cent	48.60	
Silicon @ 2.00 per cent	115.20	
Carbon @ 3.00 per cent	12.00	
	$175.80	$ 4.883
Miscellaneous: Lime, sand, spar	$ 18.00	$ 0.500
Scrap metal: Mixed borings @ $3.50	$126.00	$ 3.500
Fixed charges:	$ 58.00	$ 1.610
Total cost	$818.00	$22.734

TABLE LXVII

Operating Costs of a 3-ton Furnace

Item	Cost per day	Cost per ton
Furnace Labor: 3 helpers @ $4.00	$30.00	$ 1.00
Floor labor: 3 cranemen @ $5.00		
3 helpers @ $3.20	$21.60	$ 0.72
Supervision @ $10,000 per year		$ 1.11
TOTAL LABOR COST		$ 2.83
Power: 600 kilowatt hour @ 1c		$ 6.00
Electrodes: 20 pounds @ 8c		$ 1.60
Repairs:		$ 0.50
Alloys: Manganese @ 1.00 per cent. Silicon @ 2.00 per cent. Carbon @ 3.00 per cent		$ 4.87
Ladles and miscellaneous:		$ 0.25
CONVERSION COST		$16.05
Scrap: covering losses, etc.		$10.00
Depreciation, etc.		$ 0.83
Brokerage on selling: (Optional)		$ 1.00
TOTAL MANUFACTURING COST		$27.88
Emergency: 10 per cent of cost		$ 2.79
ABSOLUTE MAXIMUM COST		$30.67

day costs and location, that some value may accrue from their presentation.

Hold Temperature Uniform in Permanent Molds

(*Concluded from Page* 790)

Castings made in these permanent molds appear to have exceptional properties superior to those made in sand molds. In comparison tests taken from test pieces made by pouring iron from the same ladle into sand and permanent molds it was found that the permanent mold casting has a deflection approximately twice that of the sand casting and that the tensile and transverse strength are in the same proportion. In addition, on account of the density of the structure porosity was eliminated.

With this great improvement in structural density, the permanent mold casting is easy to machine. Under production conditions castings, it is stated, have been machined at the rate of 200 feet per minute with the cutting tools standing up for a longer period than with ordinary gray iron. It is claimed that the finely divided form of free carbon is responsible for this condition. The smooth surface, absence of scale and accuracy of dimension also effect a considerable saving in machining costs.

The question might be asked, just what production requirements would permit the profitable employment of permanent molds. No definite amount can be named that would take into consideration all casting fields and conditions. Each casting problem must be decided upon in accordance with its own peculiar set of conditions. In some cases a permanent mold equipment has been found cheaper to build than a set of metal patterns.

In comparing results on a production scale the permanent mold in every instance has shown a superiority over the sand mold. Installations vary to suit different local conditions, but usually they are arranged in batteries of six or eight mold units. Where the casting is heavy the mold block is only provided with one cavity. Two, four and six cavities are provided in the mold blocks for the smaller castings. Three men can attend one of these batteries and the cycle of operation for the entire battery will occupy a period between about two and three minutes. Thus for example in a battery of eight piston molds each with two cavities it is possible to make 16 castings in less than three minutes. This is at the rate of 300 per hour or 2400 in an 8-hour day. Ultimate production of course will depend on the number of molds in operation.

Each permanent mold unit operating under the process has incorporated gates and vents particularly adapted to the character of the casting. These features are arranged that the molten metal enters the mold with a minimum washing and erosive action and the air and gas escape freely. The style of gate on the radiator section shown in Fig. 6 illustrates this point. The gate and runner is formed in core sand enclosed in two, half-metal forms. The forms act as coreboxes and drygers. After the sand is dried the two halves are pasted together and the assembled runner is placed in a suitable cavity in the mold proper. The cost of the forms and the labor involved in filling them with sand is negligible, but they protect the mold from the erosive action of the falling iron and in that manner the mold itself is expected to last indefinitely.

TABLE LXVIII

Cost of Electrically Melted Gray Iron Produced from Scrap Iron

Item	Cost per ton
No. 1 scrap 8% loss @ $45.00 ton	$48.60
Limestone 50 pounds per ton @ $4.00	0.10
Fluorspar 6 pounds per ton @ $25.00	0.075
Carburizer: Coke, coal, ground electrodes	0.60
Ferromanganese 8 pounds per ton 5c pound	0.40
Ferrosilicon 60 pounds per ton 5c pound	3.00
Power, cold melt 450 kilowatt hour 1½c	6.75
Electrodes 15 pounds graphite per ton	3.45
Linings:	
Walls	0.30
Hearth	0.20
Roof	0.30
Lining repairs:	
Banking repairs	0.35
Roof patching	0.15
Spout and slag doors	0.20
Ladle lining	0.20
Ladle drying	0.30
Furnace tools	0.25
Labor:	
Metallurgist and superintendent 30% of time at $500 a month	0.833
Head melter, two at $8.00 per day	0.60
Helper, four at $4.50 per day	0.90
Furnace floor labor, two at 40c hour	0.32
Ladle pit labor, two at 40c hour	0.32
Ladle liner, two at 50c hour for 8 hours	0.40
Scrapyard labor, two at 40c for 8 hours	0.32
Shop labor	0.25
Chemist and laboratory supplies $200 and $50 per month	0.416
Unproductive payroll	0.10
Depreciation furnace equipment at 10%	0.582
Amortize fce. invest in 10 years	0.582
Interest at 7 per cent a year	0.408
Insurance	0.09
TOTAL PER NET TON	$71.35

Based upon 500 tons monthly.

Water From Tanks Leaks Through Floor

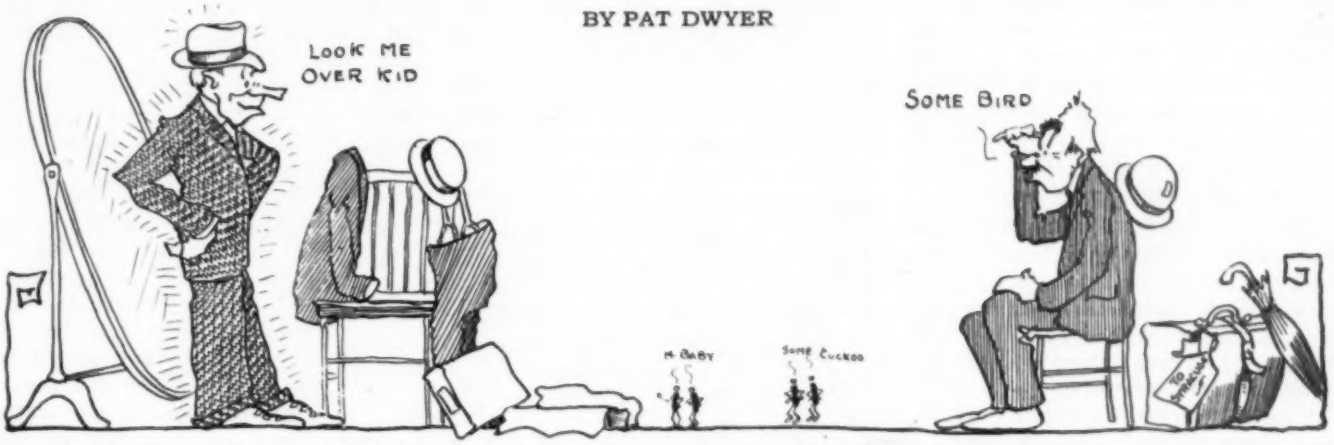
Question: Water overflowing from our nickeling tanks on the second floor leaks through on to the first floor. We have tried every method with which we are familiar to prevent the floor from leaking but up to the present have not succeeded. The floor is made from regular flooring laid over diagonal strips. It is covered first with sheet lead and then with cement varying in thickness from 2 to 4 inches. We shall appreciate any advice on how to overcome the trouble.

Answer: We confess we are at a loss to understand how water possibly could leak through a floor of that character. However, since it does leak, the obvious remedy either is to construct a new floor, or, prevent the tanks from overflowing. The second alternative is the simpler of the two and only involves a little pipe fitting by which the water may be conducted out of the tank before the tank is filled to the overflowing point.

In the event that we have misinterpreted your inquiry and that you are referring to water that is slopped over during the operation of lifting the castings into and out of the tanks, we suggest that you either place a sloping apron around the outside upper edge of the tank, or, mount the tank inside a shallow water tight sub-base something after the fashion of a cup sitting in a saucer. A pipe connected to the lowest corner of the sub-base would serve to conduct the water to a suitable drain, and eliminate any damage from this source.

Bill Is Reminded of the Cardiff Giant

BY PAT DWYER



WHEN I called on Bill the other night I found him trying on a new suit. His taste in clothes does not coincide with mine, but I realize that this is a free country and a man has a perfect right to clothe himself in any manner his fancy may dictate. I might have tolerated the light gray hat turned down in front, the powder blue suit with the exaggerated cuffs on the pants, the long tan shoes with the wide laces; but the red dotted purple tie was an abomination to the Lord and the poisonous green socks with yellow bars were enough to give a wooden Indian the jaundice. Bill gazed on the reflection in the glass with unconcealed approval and then turned himself slowly around for my benefit with the modest request: "Look me over, kid. Look me over!"

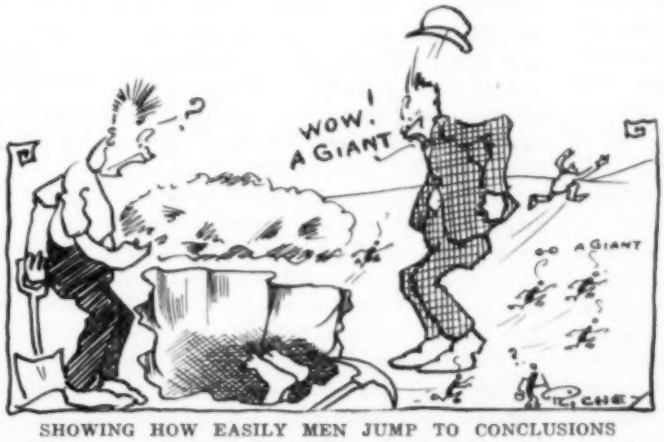
Acquaintanceship over a long period of years has conferred privileges beyond those enjoyed by casual friends and I felt free to express an opinion without bias, fear or favor. I told Bill honestly if I was a judge on the bench and if he was haled before me —as quite properly he should be for masquerading in such a costume—I should sentence him to 10 years hard labor on the rock pile. What he really deserved was to be attached firmly to a big fat rock and thrown into the lake. Nothing but the fact that the green socks undoubtedly would poison all the fish within a reasonably cruising radius of the city would prevent me from imposing the second and more deserving sentence. Bill smiled an amused and tolerant smile and remarked kindly that jealousy was a terrible affliction. So far as he knew only one thing was worse and that was a craven fear of what other people might think or say. Usually the two went together and any man who combined the two in the apology for a thing which he flattered himself was his mind, was a total loss.

"This rig," said Bill, "is a knockout. It is attractive, handsome and will excite a certain measure of comment in a crowd and if I am not unduly inquisitive what other reason has a man for wearing clothes? Just to show you that I am not prejudiced in any manner and that I am willing to argue the question strictly on its merits I am willing to admit that clothing is worn as a protection for the body and perhaps incidentally to conform to certain laws duly made and provided by censors of morality.

"However, if a man was influenced solely by these considerations he might as well be a rabbit. These little animals all dress alike and perhaps that is one of the reasons they are rabbits. I am no rabbit, my boy and when I buy clothes I buy something that indicates I am a free and independent citizen with a mind of my own. An outward and visible sign that I don't care two warts on a pickled cucumber for the opinion of those self satisfied guys who set up as arbiters of fashion. I should like to know by what divine right they assume to dictate to other men what they shall wear."

Clearly no benefit was to be gained by prolonging an argument along aesthetic lines with a man who has no conception of the harmony of color or one who has no scruples about introducing factors that have no bearing on the point at issue. Rabbits indeed! I have seen rabbits garbed in many colors while living and even under a greater variety of colors after they were dead. With a view of changing the subject to some extent and yet not too abruptly I asked Bill why he had bought the suit at this time of the year.

"Well" said Bill, "I'll tell you. I'm going down to the convention in Syracuse and I know from experience that I can get a greater kick out of the event when I am inside a doggy new suit. The missus is debating whether or not she will need a trunk for her outfit, but I am a modest lad and figure I can wiggle along for four days with one suit. I can remember the time when one suit served me seven days a week. The only difference between week days and Sundays was that on Sunday I brushed the foundry dust from the old derby. Back in those days I played a limited engagement in the old Straight Line Engine shop and while there I heard for the first time the story of the famous Cardiff giant. At the time I considered the transaction a rather clever piece of work, but in recent years when I read of elaborate schemes for separating the public from its money I have arrived at the conclusion that the perpetrators



SHOWING HOW EASILY MEN JUMP TO CONCLUSIONS

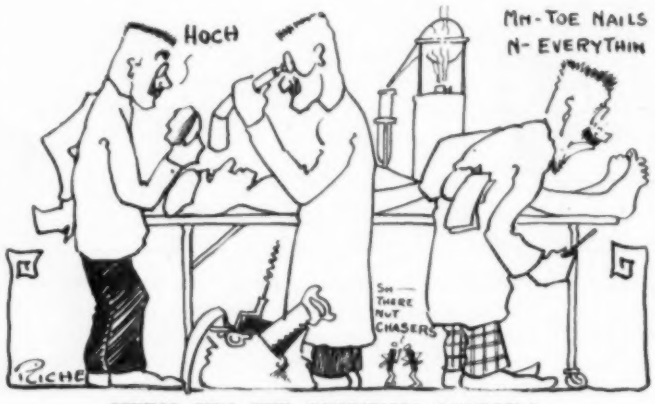
of the hoax were only amateur crooks. They lacked the true artistic temperament. The divine flame which separates the creative genius from the mere artizan. With a deposit of salt under the city almost equal in extent to one of the coal beds in Pennsylvania, these lads were satisfied with a stone figure when they easily could have carved a figure in salt and made a fortune exhibiting it as Lot's wife." "I suppose" I said, "I should be ashamed to admit my ignorance, but who and what was this Cardiff giant? I have heard of giants in Ireland, quite a few are sprinkled through the pages of the Arabian Nights, if I remember aright David had a tilt with one on a certain memorable occasion and it seems to me Jack found one on top of the beanstalk, but I never heard of one in America."

"Objection noted" quoth brave Bill "for the benefit of the gentleman from Missouri I might say that probably there are many things of which he never has heard. Draw up your little stool my dear and grandpa will tell you the story of how a group of wicked men imposed on the credulity of the public, puzzled the entire scientific world and gathered in many large bags of the shining shekels.

"While digging a well on the farm of an estimable citizen the workmen encountered what appeared to be a large stone at a depth of 15 feet. Honest and conscientious lads instead of drilling a hole and blasting a hole through it they dug all around the obstruction and exposed the figure of a man about 10 feet in length and wide in proportion. The owner was notified and hurried to the scene. At first he was inclined to bewail the sad fate which prevented him from completing the well, but that did not deter him from sending a discreet news item to several newspapers. The news spread like wild fire and visitors arrived by thousands to view the curiosity. Our hero erected a tent over the opening in the ground and charged an admission fee of 50 cents. So great were the crowds who swarmed to the place that the receipts averaged $1000 a day.

"Newspaper editors in those days, modern opinion to the contrary notwithstanding, were fully as appreciative of what constitutes news as are their present day representatives. They played the item up in great style and the stone giant enjoyed more free publicity than even is accorded our own sterling shipwright Jack Dempsey today.

"Scientists wrote learned treatises on the subject. Archeologists admitted that it upset all former theories regarding the early inhabitants of America. With the fossilized proof before their eyes it was evident that a gigantic race at one time had dwelt in the land and the only question was whether these men had been contemporary with or actually had antedated the mammoth and dinosaur.



GIVING HIM THE SCIENTIFIC DOUBLE-O

"The excitement lasted about a year and then the bubble was pricked and all the hot air escaped. A doubting Thomas in the person of a Yale professor had a small piece of the stone-man analysed and discovered that it was gypsum. This material is soluble in water and the professor reasoned that if the figure had lain in the damp earth for untold ages it should be a soggy mass. His specimen was hard and firm and the professor immediately denounced the exhibit as a fake. At first his protestations fell on deaf ears, but gradually other proofs came to light and the myth was exploded.

"All worthy men have their imitators and it was so in this case. A clever unscrupulous villain with no respect for the ethics of the faker's profession had several plaster figures made and exhibited them in various foreign countries as the original. They were accepted without question by the public and examined critically by learned associations. In Berlin a learned group secured permission to examine the figure critically and at close range. They applied the calipers and the tape and made voluminous notes in long, double decked German words with many a *Hoch!* and *Ach!* and *Ja!* as they compared the measurements with those of a typical specimen of the present day.

"Finally they decided to bore a hole in the skull with the laudable intention of examining the brain cavity. One member of the party applied his eye skilfully to the opening and believe me he got an eyefull. His eyes fairly popped in amazement and his luxuriant whiskers curled up and tied themselves in a double bowline hitch. He sank into a chair gurgling and gasping long double-acting toggle-jointed words and pointed weakly to the hole. Each of the confreres in turn took a suspicious peep and then one seized a hammer and caved in the top of the giant's skull. One of the workmen who had constructed the figure carelessly had left a stump of a tallow candle in the cavity. Subsequent investigation revealed the entire fraud as practiced in the first instance. Colleagues of the innocent farmer had quarried a block out in Iowa and shipped it to Chicago where it was carved by a member of the gang into the semblance of gigantic man. The figure was shipped to the farm where it was allowed to lie buried for a year before it was *discovered*.

"The credulity of the average man is wonderful. He accepts statements at their face value and rarely pauses to consider whether there may or may not be attending features that will show the subject up in a different light. Almost without exception visitors to America tell their home folks on their return that the output per man per day is greater in American foundries than it is elsewhere.

"Basing an opinion merely upon the number of pounds of castings produced per man per day may lead to erroneous conclusions. So many other factors must be considered that if you are seeking a comparison of costs the single item of production per man practically is worthless. The only manner in which comparison can be drawn intelligently is to provide two identical sets of conditions. This is almost out of the question even when comparing foundries in one country. When the attempt is made to compare conditions and output in two widely separated countries, the result of any investigation may be interesting from an academic viewpoint, but the knowledge gained can not, or perhaps more properly speaking will not, be put to any practical use. Those who are producing in large quantities will congratulate themselves and the small producer is quite prepared to show that under existing conditions his production is all that can be expected.

"Mechanical equipment is used so extensively in American foundries that

the output materially is affected. Manifestly any comparison between a man in a mechanically equipped foundry and a man working in a plant where such equipment is conspicuous by its absence, is like comparing the shooting ability of a man armed with a high powered rifle and a man armed with a bow. Consider a typical instance in a prominent gray iron foundry in which an average of 200 tons is melted daily. At one time the charges were loaded in the yard, pushed on buggies to an elevator, pushed around to any desired point on the charging floor and then the material was thrown into the cupola by hand. The number of men required varied from 14 in the winter to 18 in the summer.

"Later a new cupola was erected. It was not provided with any charging doors but was designed to be charged through the top in the same or almost the same manner as a blast furnace. Coke and iron were lifted in buckets by an electric traveling crane. The bucket came to rest on the top rim of the furnace, the drop bottom opened and allowed the charge to slide down the stack to its place. One man forked the coke into the bucket, while a magnet on the crane loaded the pig iron into a number of buckets strategically placed near the stock pile.

"On the face of the argument one craneman, one coke forker and one man releasing and hooking the magnet replace the former 14 or 18 men. In fact one might be justified in stating that whereas formerly 200 tons were handled daily by 18 men or an average of 11 tons each, now the same tonnage is handled by 3 men, an average of nearly 67 tons each. To put the matter in another light the wages of from 11 to 15 men are saved daily.

"The point usually overlooked is that the crane and other equipment represent a considerable outlay in installation, maintenance and repairs which of course must be taken into account in any comparison that pretends to even approximate accuracy.

"Presence or absence of sand handling equipment, power cranes, conveyors, molding machines, special flasks, a system of payment that induces men to exert themselves to capacity and other features frequently furnish a more reliable foundation than the number of men employed, on which to base certain calculations.

"In an effort to secure greater production, the tendency in American foundries is to utilize common labor and mechanical devices to the utmost extent. To that end the making of a mold is divided into many parts and spread among many operators and many machines. In that manner the skill of the trained molder may be utilized over many molds, by confining his efforts to just those features in each mold which require skilled attention.

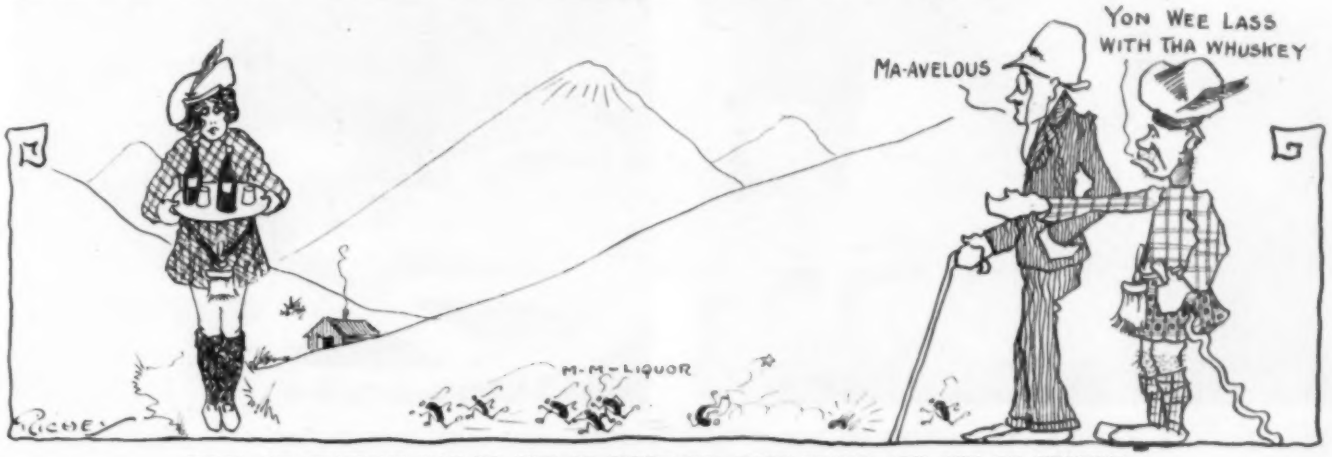
Don't fail to see pages 70 and 71 of this issue

"Obviously a comparison is bound to be misleading when drawn between a foundry operated in the foregoing manner and one in which the old time all around molder does everything himself from cutting his sand and mixing his facing up to pouring the metal and shaking out his castings. Also it is apparent that the old arbitrary dividing line between the molder and the helper no longer is of any great assistance in laying down comparisons where castings are made under a gang system.

"Bearing all the foregoing points in mind you can draw your own conclusions from the following figures representing the output and number of men employed in several representative foundries: In a locomotive foundry employing a total of 275 men the output of good castings is 65 tons a day, an average of 472.7 pounds per man per day. In this foundry 100 men are rated as molders. If the output is reckoned on the number of molders it will show as 1300 pounds each per day. A heavy general jobbing foundry with 35 molders and a total crew of 125 men turns out 25 tons of castings per day. On a molder basis this means 1428 pounds and on a total basis it represents 400 pounds per man.

"On a uniform line of heavy castings the per capita output is larger. For example on cast-iron, chilled car wheels the regular days work for a molder and helper is from 20 to 25 wheels depending on the size which varies from approximately 500 to 700 pounds. Two men cut the sand, make the molds, pour them, shake them out and in round numbers are responsible for 7 tons of castings. One of the large automobile foundries in the middle west secures a production of 240 tons of castings from a total crew of 800 men, an average of 600 pounds per man. Over the entire country I should say that about 500 pounds represents the daily average production of each molder. The figure may be interesting but it is of no practical use.

"Talking about misunderstandings" said Bill, "Reminds me of a story that had a happier outcome than most instances of that kind. A Scotch guide conveyed an English tourist into a glen which he claimed had a wonderful echo. Arriving at a suitable spot he told the tourist to shout 'Twa bottles o' whuskey.' The gentleman complied but after waiting in vain for some time he turned to the guide and complained that he heard no echo. 'Maybe no the kind of an echo ye expected' said Sandy 'But here comes yon wee lass with the whuskey!' "



FIRST AID STATIONS MAY BE OUT OF SIGHT BUT THEY NEVER ARE OUT OF HEARING

Cutting Heavy *Gates and Risers*

Cleaning Large Steel Castings Accomplished Easily by Oxyacetylene Cutting

REMOVING risers from steel castings by oxy-acetylene cutting is such a common steel foundry practice that it usually passes among foundrymen without comment, according to an article recently appearing in *Oxy-acetylene Tips*. The floor devoted to this work usually is the show point for visitors because of the spectacular nature of the operation itself. Still, oxyacetylene cutting applied to this work is simple and is accepted in the foundry as a normal and entirely routine phase of the procedure.

After watching a good cutter remove an 800-pound riser, cutting through 6 inches of cast steel, one wonders how this work was done before the oxyacetylene process came into common use. It hardly seems possible that it ever was done in any other way, especially when some of the outstanding features of this work are known.

There are many of these features. Probably the first one noted is speed, even on relatively heavy riser necks. A matter of especial importance with heavy castings is the fact that risers and gates may be removed by oxyacetylene cutting wherever the casting happens to be located. Portability of the cutting unit relieves the foundry of the necessity for moving heavy or bulky castings. Cutting may be done on the pouring floor, on the cleaning room floor as soon as the casting is shaken out and is properly cleaned, or it may be done further along in the process, possibly even after the casting has reached the finishing floor.

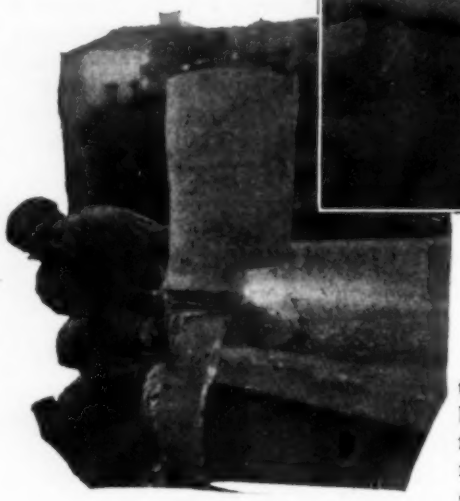


Fig. 1—(Left) Removing a 600 Pound Riser. Fig. 2—(Above) The Cut May Be Made at Any Position

Many foundrymen emphasize the fact that oxyacetylene cutting removes all limitations from the matter of gating and heading up castings. Risers may be placed in the mold where desirable. Furthermore, risers may be as large as desired.

In pursuing this thought to its logical conclusion, several foundries with long experience with the oxyacetylene process have found it possible to redesign their castings, taking into consideration this method of removing the risers. The results have been better castings and simplified pattern making and molding practice.

Another important fact is that with the oxyacetylene process, cuts may be made so close to the line of final finishing that much machining is eliminated. This reduces the final cost of heavy castings. Employment of the best cutting practices is essential in securing the most satisfactory results in this kind of work.

In one large eastern steel foundry, these factors have led the management to regard oxyacetylene cutting as one of the most important steps in their production work. Application of the best practices has resulted in an excellent grade of cutting, with important reductions in the time required for finishing. Fig. 1 illustrates this point. In removing the 600-pound riser from a ladle-bail casting, the cutter has followed the shape of the finished part. The final cut was so smooth that little machining and grinding were required, even though the neck of this riser was 7 by 14 inches.

In this foundry, cutting is done near the place devoted to cleaning.

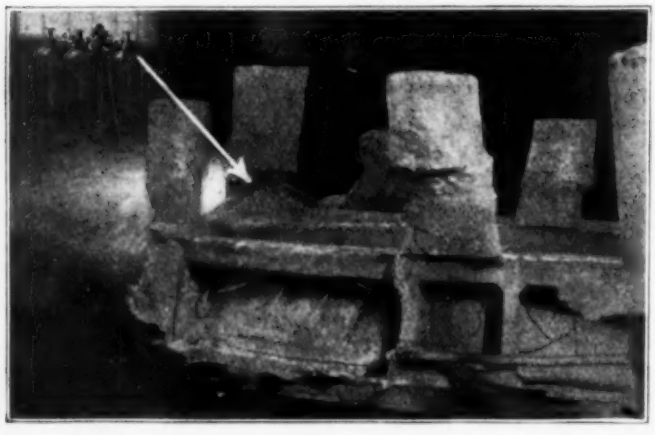


FIG. 3—THE CUT FOLLOWS THE CONTOUR OF THE FINISHED CASTING. FIG. 4—SIX INCH SQUARE RISER NECKS ARE CUT IN ABOUT 1½ MINUTES

The building is piped for acetylene furnished from a low pressure generator situated in a small separate building, and cutting stations are arranged along the walls. Hydraulic back pressure valves are located in H-columns for convenience and to protect them from any damage from passing workmen or equipment.

Although in many large foundries it has been found advantageous to pipe oxygen through the plant from a large central manifold, in this plant it is considered most desirable to use separate five-cylinder oxygen manifolds for each cutting station. The former method eliminates entirely the necessity for moving full and empty oxygen cylinders through the buildings and centralizes the responsibility for cylinder handling and accounting. In addition, use of the central 20-cylinder manifold makes it economical to utilize the pressure remaining in the cylinders after they may be used no longer for heavy cutting at welding stations or at cutting stations where the operators are working on light material.

Where foundries are cutting on castings of special shapes and sizes rather than on the general production of quantities of a fixed size, it often is considered desirable to let each cutting operator regulate his own oxygen pressure. The foundry in question claims that this may be done best with the individual five-cylinder manifolds.

FIG. 5—SMOOTH CUTS WITH SHARP EDGES ARE MADE EASILY

An outstanding feature in this foundry's work is the careful cleaning of the riser necks before cutting. After castings are shaken out and most of the sand removed, pneumatic chippers and later the sand blast are applied. The helper at each cutting station has a wire brush handy to take care of any sand or dirt that may possibly have survived these other methods of removal. This practice is much preferable to the wasteful method, which was formerly quite common in smaller foundries, of blowing off sand with high pressure oxygen applied with the cutting blowpipe.

Operations in most large steel foundries are so arranged that the cutter may work as long as possible on riser necks of about the same size. This often is accomplished by segregating the castings, into groups according to size of risers, however, some castings will have gates and risers of varying sizes. In handling these, a cutting operator will complete all cuts of a certain thickness, and then will adjust his blowpipe nozzle and oxygen pressure for the next size. This procedure has economy to recommend it as opposed to the practice of cutting of risers regardless of size with a pressure heavy enough to handle the thickest cuts. In addition to economy, cuts made with the proper oxygen pressure are cleaner and smoother than cuts made with pressures either too high or too low.

Prominent Eastern Foundryman Dies

LOUIS SACKS, for many years one of the best-known figures in the foundry industry in the New York metropolitan district, died at Long Beach, N. J., Sept. 11. Born in Baltimore 74 years ago in extremely humble circumstances, Mr. Sacks headed toward New York at an early age. He first set up in business selling shoes at Newark, N. J. Obtaining credit from the old New York firm of H. B. Claflin & Co., he would take a pack of shoes to Newark and peddle them from house to house, going back to New York each time for another load. His business grew and he later branched out into the sale of shoemaker's supplies. In that connection, about 40 years ago, he organized the Star Heel Plate Co., Newark, being a pioneer in the heel plate business. His purchases of iron castings grew to such a volume that he decided to make the castings himself, and he set up his first foundry in 1902. At the time of his death his active companies included the Louis Sacks Iron Foundry, the Newark Malleable Iron Works, the Star Heel Plate Co., the Ajax Foundry and the Brass Founders Supply Co., all of Newark. In recent years he had paid attention particularly to the production of malleable castings. All of these companies are controlled by a holding company, Louis Sacks Inc. Mr. Sacks' business foresight was remarkable. When he bought pig iron, for instance, eastern foundrymen followed his lead, having found from experience that he was an unusually good judge of the market. Incidentally, Mr. Sacks bought pig iron in the old fashioned way, making the rounds of the sales offices in New York when he was in the market. When Mr. Sacks built his original foundry in 1902, he located it in a section of swamp land then considered worthless. Later, after the city extended and grew up around the plant, Mr. Sacks' site became one of the most valuable in Newark. Mr. Sacks was a member of the Newark Foundrymen's association, the National Founders association and other bodies. He was president of the Atlantic Building & Loan association and the Traders Building & Loan association of Newark and was well known in banking circles in Newark. He is succeeded by his son, David L. Sacks, manager of the business.

Milestones in Foundry Progress

As Recorded in the October Issues of THE FOUNDRY, Thirty, Twenty and Ten Years Ago

1895

FOR the first time in its history, the thriving Western Foundrymen's association journeyed to Milwaukee, John M. Sweeney, Consolidated Iron & Steel Co., Harvey, Ill., was president of the association. Foundry economy and cost methods were the main subjects considered. And the banquet! This must have been a feast of food and fun, according to accounts.

* * *

Two street cars of the openface pattern were chartered to take the visitors to the various foundries of Milwaukee on an inspection trip.

* * *

The meeting called by the Philadelphia Foundrymen's association to form a national association, which was to have convened Nov. 20, 21 and 22 in that city was postponed until the following spring, according to a brief note.

* * *

This was the first life stirring of the present American Foundrymen's association.

* * *

For the advancement of human intelligence it is found necessary to record the experiences of the past. Not only success, but failure also is shown up as a warning to coming generations not to repeat it. The results of man's labor inscribed upon the pages of history furnishes a bridge over which we may pass safely and quickly without wasting too much of our short lives in obtaining results already reached by our predecessors.
KRANK'S KORNER

* * *

The willingness to impart knowledge to others has been responsible for the growth of the foundry industry.

* * *

Any old timers remember "Pokey's Pointers"? He represented the damphool owner saved by the grace of Providence and a foreman named Tom Bowers from general ruination.

* * *

Pokey suggested that the shop needed a superintendent to lend class to the establishment. Suggested a cheap man, who would admit that he was good and who could have a speaking tube in the office to transmit orders, thus impressing the customer.

* * *

The Texas Foundrymen's association was agitating for lower freight rates.

* * *

Root Brothers Co., Plymouth, O., were contemplating a new foundry.

* * *

RUTHLESS RHYMES

"Them goggles fine is all the bunk,"
Said Reckless Pete, the Finn.
"Ping! Ping!", you can hear the coppers plunk
In the blind man's cup of tin.
A. V.

Faked Foundry Facts

The Spout

1905

PORT HURON ENGINE & THRESHER CO., Port Huron, Mich., was a leading industry of that city, with two gray iron foundries and a malleable shop. These were described in THE FOUNDRY of October, 1905. The drive wheel for a traction engine, was one of the most interesting castings made.

* * *

Stiffer prices were obtaining on pig iron, No. 2 northern selling for $15 furnace. Coke was $2.45 a ton.

The first anniversary of the British Foundrymen's association was celebrated in August, 1905. Robert Buchanan of Birmingham was president.

* * *

John Doyle told of melting war scrap four years after the Civil war, when a supposed empty shell let loose adding two belated casualties to that bloody conflict.

* * *

Percy Longmuir, whose name is familiar as a distinguished British metallurgist presented an article on steel castings.

* * *

Pete Cady's foundry, constructed from odds and ends and safety pins was described by Harry Malone. This famous shop made repairs for harvesting machinery in competition with the so-called trust.

* * *

Charles Vickers told some interested inquirer the proper mixture for sleigh bells.

* * *

Would the same composition go for the kind of bells the modern flappers wear on their garters, Vick?

* * *

The Davenport Foundry & Machine Co., Davenport, Ia., was building foundry and pattern shop additions.

1915

ONE big week at Atlantic City during September was reported in THE FOUNDRY of October, 1915. Such names as R. A. Bull, Henry A. Carpenter, G. H. Clamer, Jesse L. Jones, Major Speer, J. P. Pero, Ben Fuller and J. S. Seaman loomed large in the affairs of the convention.

* * *

Robert E. Kennedy, now assistant secretary of the American Foundrymen's association collaborating with J. H. Hogue presented a paper on foundry training for apprentices.

The FOUNDRY

SELLING THE OUTPUT

The FOUNDRY

What The Industry Needs Today Is Sales Not Production

It's Lucky Noah Was Not Too Busy TO BUILD A BOAT

P. T. Barnum Says!

WORK at it, if necessary, early and late, in season and out of season, not leaving a stone unturned, and never deferring for a single hour that which can be done just as well now.

DURING this season of the year, when conventions are popping away all over the country, like a pack of fire crackers, the man who finds himself "too busy" to attend those most closely allied with his business deserves universal sympathy. I don't mean that you should drop a tear in tribute to his being overburdened with work, nothing like that. He has hallucinations just as surely as the fellow who believes he sees pink elephants and green alligators coming over the transom into his hospital room. He just *thinks* he is too busy.

—: :—

EVIDENTLY from the remarks of P. T., quoted above, he believed that a man should be everlastingly at it, but he used discretion. He did not feel that he had to stick in the box office and handle every quarter, nor did he insist on personally manicuring all the lions in his menagerie. He had a true appreciation of relative values. If he heard about a new dwarf in Austria, or a singer in Sweden whom he wanted to secure for his attractions he made the matter one for his own attention. He always had time to devote to his own best interests.

—: :—

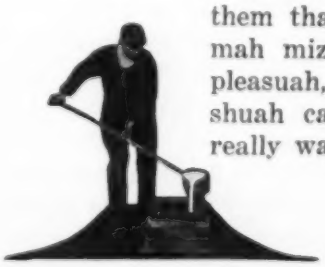
NOW as to the application to foundrymen. Why a casting manufacturer who is physically sound and financially able should absent himself from the annual gatherings of the A. F. A. is more than I can understand. If he fails to find anything of value in the technical sessions of a convention like that of the association, and they sure do give enough variety, let him wander around a bit among other foundrymen, swap stogies with a competitor and otherwise stick his inquisitive nose out from under his shell of constant application. Hard work may produce a great many benefits, but it never yet produced an idea. Ideas are born only from a union of minds.

—: :—

THEN there are the exhibitions that form a part of the large national conventions. Here ideas are offered ready made, and if you will stand around patiently and listen to some of the bright lads who are in charge of the exhibits, they will give you more information, ideas and—yes—advice as to what to buy, than you could accumulate in weeks of sitting around on the job. The modern salesman, such as you find around these big exhibitions of manufacturing equipment and supplies, represents a type worthy of the foundryman's time and study. Usually the salesman knows his machine or commodity from the ground up, and further he has dipped into the foundryman's own business to the point where he can give that individual several pointers. A lesson in the art of selling is, in itself, not amiss.

—: :—

NO I haven't any patience with the bird who is "too busy" to go to a convention devoted to his interests. He hasn't half the excuse of the colored soldier who asked to be relieved from special detail. He said he had to hunt "rithmetic" bugs, said he called them that because they "adds to mah mizery, subtracts fum mah pleasuah, 'vides mah 'tention and shuah can multiply." That boy really was busy.



Phineas, Jr

The Shakeout

DAN M. AVEY, Managing Editor
PAT DWYER, Engineering Editor
CHARLES VICKERS, Nonferrous Editor
FRANK G. STEINEBACH, Associate Editor

¶Why Not Have Your Say

CONSIDERING the willingness and facility with which the average man expresses his opinions on practically any subject, considering also that the pages of technical magazines, or for that matter pages of any publication, always are open for a presentation of opinion, one is led to wonder why a greater number do not choose to place their views before the public. By this is not meant that one is expected to rush into print every time he feels the necessity of using more than 15 words in which to unburden his mind. To the orderly and well balanced mind there is a time and a place for everything and the average man is quite qualified to decide when a written comment would be both welcome and appropriate.

PROGRESS in any line depends on the interchange of opinion and experience between those engaged in that line or others closely allied. No one possibly can know it all or work out every problem of the industry by himself. Many men have many minds and for that reason it is only natural to find that any given problem is viewed from many angles. Any person wishing to secure a proper conception of the subject necessarily must become familiar with all or nearly all the viewpoints before he can arrive at a satisfactory decision or one that is of any worth.

SOMETIMES a description of a device or a process is published which does not meet with the approval of a reader. He may have had a greater measure of success from tackling the problem from a different front. Clearly, if he has the proper conception of what constitutes the duty of any member of a business or profession he will comment upon it. Verbal comment before one or two people is wasted. To have any effect it must appear upon the printed page before the eyes of thousands. Also a person is more careful with his facts in a statement prepared for publication, than he is in a mere verbal statement made in the presence of a few cronies.

¶Advertising Sells Good

RECENT advertising experiment by a prominent machine tool builder has excited considerable comment among those engaged in the same or allied lines and to a certain extent among all manufacturers who cater to a restricted clientele. Restricted in this instance is used to differentiate between the limited number who find use for a certain product as compared with the limitless multitude who absorb such necessities as food and clothing. Instead of broadcasting the news to the world and trusting that the seed might settle on fertile soil in a few places this machine tool company conceived the idea of inviting a hand picked delegation of potential buyers to visit its plant and see the machines in operation. The company officials banked on the belief that if their machines actually were given an opportunity to demonstrate their range and capacity, they would sell themselves.

THE experiment illustrated several points involved in the production and sale of machine tools. For one thing it showed in a startling manner that the cost of marketing the product exceeds any other single item in the sequence of production and sale. The tool company paid the traveling and other expenses of the visitors and while the amount was not given out, any person familiar with railroad rates, taxi fares and hotel charges knows that the total bill for 1500 people over a period of five days will approach perilously close to the $100,000 mark. This amount would buy quite a respectable amount of advertising space in technical publications.

PRESUMABLY records of sales made as a result of this direct offensive will be compared with sales made over former periods measured by the appropriation spent for advertising during any one of these periods. Sales managers in many places would welcome a report of the ultimate findings, but probably never will receive it. After a parade has passed the reviewing stand the brass band is the first unit to disappear.

Trade Outlook in the Foundry Industry

PRACTICALLY all factors point to a satisfactory volume of business for foundries during the fall. Building continues at a high rate. The railroads again are showing an inclination to purchase cars. Automobile manufacture which has been slightly set back again is going forward. Steel production has taken an upturn following several months of decline, while the total output for the year probably will be large. Continued favorable conditions and good prices for farm products promise an unusually prosperous year for the farmer.

Malleables Quiet

Malleable iron foundries continue to operate on a limited schedule. Probably the average for the entire country is not over 50 per cent of capacity. The lack of railway orders has been the greatest factor in producing this condition. Those foundries which have been engaged in making automotive parts, implement work and miscellaneous electrical castings have been fairly active. Business in the malleable line of castings manufacture has been keenly competitive and prices are not satisfactory. The prevailing condition is well reflected by a situation where a foundry was represented by a salesman operating entirely on a commission basis and handling a number of other accounts as well. The commission on the malleable account as agreed between the foundry and the agent formerly was 5 per cent. Recently competition has been so sharp, that the foundry has been forced to its lowest possible price. To get any business, this foundry's agent has been forced to shave his commission to meet competitors' prices. His commissions in many cases have been 2 per cent, and in a few instances he has accepted work which would yield him no return, to keep certain customers' names on his company's books.

Prices for Raw Material for Foundry Use

CORRECTED TO SEPTEMBER 19

Iron		Scrap	
No. 2 foundry, Valley	$19.00	Heavy melting steel, Valley	$17.75 to 18.00
No. 2 Southern, Birmingham	18.00 to 19.00	Heavy melting steel, Pitts.	18.50 to 19.00
No. 2 foundry, Chicago	21.00	Heavy melting steel, Chicago	16.00 to 16.50
No. 2 foundry, Philadelphia	21.26	Stove plate, Chicago	16.75 to 17.25
No. 2 foundry, Buffalo	19.00	No. 1 cast, Chicago	20.25 to 20.75
Basic, Valley	18.50	No. 1 cast, Philadelphia	18.50 to 19.00
Basic, Buffalo	18.50 to 19.00	No. 1 cast, Birmingham	16.00 to 16.50
Malleable, Chicago	21.00	No. 1 cast, Buffalo	17.00 to 17.50
Malleable, Buffalo	19.00	Car wheels, iron, Pittsburgh	17.00 to 17.50
		Car wheels, iron Chicago	17.50 to 18.00
		Railroad malleable, Chicago	19.00 to 19.50
		Agricultural, mal., Chicago	17.25 to 17.75
		Malleable, Buffalo	19.00 to 19.50
Coke			
Connellsville foundry, coke	$4.25 to 4.75		
Wise County foundry, coke	4.50 to 5.25		

Rail Orders Expected

A factor which gives encouragement to malleable foundries and also to a great many steel foundries which have been hard hit during the past few months is the prospect for improved railway orders. On Aug. 31 according to the American Railway association, the surplus idle cars reported dropped below 200,000 for the first time in many weeks. Increased shipments, coupled with the heavy demands now placed on rolling stock indicate the urgency of replacement buying in the near future. Car orders placed during the week of Sept. 15 totaled over 3000, while inquiries extant in Chicago on that date were reported in excess of 7600. Several conditions indicate that railway orders soon are to materialize. Shipments continue at a high level, while the demands of service under present methods of operation give greater car mileage to each unit and with greatly increased loading. Further, earnings have increased and with the completion of mergers which are expected, purchases will be favored.

Auto Output Drops

August showed a decline in automobile construction, according to the department of commerce. The total production of passenger cars and trucks for the United States and Canada together only equaled 259,399 units in August, compared with 399,631 for July. Some of this decrease in output may be attributed to changes in models which were effected by a number of makers during August. Further, operating difficulties were encountered by one of the large manufacturers whose production makes an appreciable addition to the monthly totals. The number of automobiles manufactured during the first eight months of the year makes a creditable showing in comparison with 1924. During the period mentioned, this year shows a total of 2,516,339 against 2,351,913 for last year. Sales are reported satisfactory, stimulated by changes in model and by substantial price reductions offered by various makers. Jobbing foundry business is spotty. One small town maker of miscellaneous municipal castings, such as gutter inlets, manholes, traffic signal systems and waterworks sundries is working full time with a night shift employed to clean up and handle the excess work in finishing small work. In a neighboring city, a similar establishment is employed only part time. The Ohio State Foundrymen's association, according to A. J. Tuscany, secretary, reports a slight recession during August, operations being 76.8 per cent of normal.

Nonferrous Operations

Brass and aluminum foundries are fairly active. Those making automobile castings are busy, while plumbing goods shops expect an increased demand with early fall. In Ohio, nonferrous foundry operations are reported as 60.5 per cent of normal during August. New York prices for nonferrous metals, according to the *Daily Metal Trade* of Sept. 19, follow: Casting copper, 14.20c to 14.25c; electrolytic copper, 14.55c; Straits tin, 58.75c; lead, 9.50c; antimony, 17.00c; nickel, 38.00c; No. 12 aluminum, remelt, 24.00c. Zinc is 7.75c to 7.80c, E. St. Louis, Ill.

Comings and Goings of Foundrymen

HARRY F. WAHR who has been vice president of the Mesta Machine Co., West Homestead, Pa., since the late Frederick E. Mesta succeeded his brother as president of that company, has been elected president and will carry on the well established policies of the Mesta company. Mr. Wahr was born in Pittsburgh in 1884, received his education in the Knox public school, the Park institute and the Western University of Pennsylvania, now the University of Pittsburgh. He was graduated with the degree of mechanical engineer in 1903. Immediately afterward he became affiliated with the Mesta Machine Co. and for a number of years was connected with its engineering and metallurgical departments. He later was made secretary and sales manager and when George Mesta died and Frederick E. Mesta became president, he was made vice president.

N. F. Russell, president of the United States Cast Iron Pipe & Foundry Co., Burlington, N. J., is spending several weeks in Europe.

Magnus Nesheim has been made general foundry foreman of the Western Iron & Foundry Co., Wichita, Kan. Mr. Nesheim formerly was foundry superintendent of the Phoenix Mfg. Co., Eau Claire, Wis.

John T. Llewellyn, formerly vice president, has been made president of the Chicago Malleable Castings Co., Chicago, succeeding his late brother, Silas J. Llewellyn. Paul Llewellyn and James S. Llewellyn were elected vice president-treasurer and vice president-secretary, respectively.

Guy E. Lown, purchasing agent of the Masey Harris Harvester Co., Batavia, N. Y. has been elected a director and treasurer of the company to fill the vacancies left by the recent death of Edward C. Atwater. Mr. Lown, who has been with the company for 27 years, will continue in charge of purchasing. Henry K. Buezemaker, Rochester, who has been auditor of the company for several years, has been elected secretary.

James B. Armstrong has been appointed district sales manager for the Lebanon Drop Forge Co. and the Lebanon Steel Foundry with offices at 303 Fifth avenue, New York. Mr. Armstrong was for several years connected with the Bethlehem Steel Co.'s New York offices; at first in charge of the sale of drop forgings and later handling pig iron sales. During the past year he represented Henry H. Adams & Co. in the New York territory.

Gas Men To Meet

Problems affecting the future fuel supply of the country will be discussed at the seventh annual convention of the American Gas association to be held Oct. 12-16 at Atlantic City, N. J.

Recent developments in the iron and

HARRY F. WAHR

coal industries will form the basis for much of the deliberation of the gas men at this meeting. The position of the manufactured gas industry in substituting its product for present methods of employing the fast disappearing natural deposits will be discussed by a number of speakers. A general conference will be held to deal with questions of public relations.

An exhibit of gas appliances will be held on the steel pier as in former years, with 195 exhibitors.

Plans New Warehouse

General Electric Co., Schenectady, N. Y., is having plans prepared by the Austin Co., Cleveland, for a large warehouse and office building at Santa Fe avenue and Fifty-second street, Los Angeles. The warehouse besides housing handling machinery to move the stock will include a cafeteria for employes. One of the features of the new building is that it will be heated by electricity. The building is expected to be ready by the first of the year.

Choose New Manager

L. M. Zimmer recently has been appointed general sales manager for the Linde Air Products Co., manufacturer of oxygen and of the welding gas division of the Prest-O-Lite Co., Inc., manufacturer of dissolved acetylene. Mr. Zimmer who succeeds L. M. Moyer has been employed by the Linde company for the past nine years and since 1924 has been assistant general sales manager.

Will Build at Chicago

Valley Mould & Iron Corp., Sharpsville, Pa., has closed a contract with the By-Products Coke Corp., Chicago, for hot metal requirements and will commence at once the construction of a branch plant at Chicago. It hopes to have this plant in operation by Feb. 1926. This will not interfere in any way with the operation of the Sharpsville plant.

Stove Plant Reopens

The New Castle plant of the Stove & Range Co., at Pittsburgh, resumed operations recently after a shutdown of several months. More than 100 skilled men are employed in this plant.

Elected Secretary

Earl Seale has been elected secretary and assistant treasurer of the Domhoff & Joyce Co., Cincinnati, pig iron and coke merchants. Mr. Seale, who has been connected with the company for the past 13 years, succeeds Clarence Hayward, who recently resigned after 25 years of service to enter the real estate business in Florida.

A Correction

Through an error, the article appearing in the Sept. 1 issue entitled "Hardness Governs Machinability" was credited to James Ward. This article was written by John W. Bolton and should have been credited to him.

Gives More Information on Stainless Steel

Much interest has been displayed in the article "Making Cast Stainless Steel" by J. M. Quinn which appeared in the July 1 issue of THE FOUNDRY. One subscriber writes:

We were much impressed with the article on stainless steel, written by J. M. Quinn. This is a very concise article and gives considerable information bearing out most of the little practice we have had in making high chromium steel.

If Mr. Quinn would give the thickness and the general shape, together with the weight of the castings described in this article, we think he could make this article a complete history of high chromium steel.

Mr. Quinn in answer to this inquiry gives the following information:

The smallest castings made were globe valve seats for valves ranging from 1½ to 3 inches in size. Other small castings made were golf club heads and hand hatchets. The weights and dimensions of these castings approximate those produced from other metals.

The heavier castings included glass molds for forming glass baking dishes. The square baking dish mold was the most difficult to make because of excessive shrinkage. The mold was of the shape of the dish and the walls were approximately 2½ inches thick, permitting ½ inch for inside machining. These castings weigh about 50 pounds as cast without risers, which in each case weighed as much as the casting.

In making these mold castings, it was necessary to suspend two clean, soft steel pieces in each corner to prevent tearing or shrinkage cracks as the metal solidified. In pouring heavy stainless steel castings the risers should be kept open by churning with a small rod, and additional steel should be added just before the metal in the mold becomes too spongy. This will give a more solid casting.

Develops Rosin Binder

Rosin, one of the first products used as a binder in the manufacture of cores, still maintains a place especially in cores for certain classes of malleable, steel, brass, bronze and aluminum work. Recently the Lindsay-McMillan Co., Milwaukee, developed a product which, it is claimed, successfully replaces rosin in core work. The product consists of a rosin specially treated so that it will be held in solution. The greatest portion of research work carried on in connection with this work was to determine a solvent that would carry in solution a maximum amount of rosin, having the resultant mixture workable and practical for core work. Some advantages reported for this product over powdered rosin are that it eliminates the work of handling powdered rosin, and that it produces a smooth core without rosin spots, eliminating rosin holes in the core.

Changes Firm Name

The Watson Engineering Co., New York, in the future will be conducted under the name of Wilbur Watson and Associates. No changes will be made in personnel. The company has established a branch office at 522 Stock Exchange building, 1411 Walnut street, Philadelphia, with R. E. Reynolds as resident manager.

Forms New Company

G. M. Sparks and C. E. Brinker have formed a corporation capitalized at $75,000 at Romeo, Mich., and have taken over the Holmer Foundry Co., located in that city. The plant will be devoted to the manufacture of automobile castings. Officers are as follows: H. D. Rumsey, president; C. E. Brinker, vice president and general manager; G. M. Sparks, secretary and treasurer. L. A. Holmes and L. E. Bedell also are members of the board of directors.

Takes Over Plant

Buckeye Porcelain Enameling Co. has been incorporated under the laws of Ohio to take over the plant and equipment of the Cincinnati Enameling Co., Cincinnati. The new organization has been formed by the Porcelain Enamel & Mfg. Co., Baltimore. James Gould, former superintendent of the Scranton plant of the latter firm, will be in charge at Cincinnati.

Dr. Campbell Dies

Edward De Mille Campbell, professor at the University of Michigan, and prominent in the activities of various technical and engineering societies, died Sept. 19 at his home in Ann Arbor. Dr. Campbell achieved unusual fame because he obtained most of his honors since handicapped by blindness in 1893. He was born Sept. 9, 1863, and was graduated from the University of Michigan in 1886. He was chemist for the Ohio Iron Co., Zanesville, O., in 1886-7; for the Sharon Iron Co., Sharon, Pa., 1887-8; Dayton Coal & Iron Co., 1888-90. He left industry then to accept a position with his alma mater, becoming assistant professor of metallurgy in 1890. He became a junior professor of metallurgy and metallurgical chemistry in 1893; junior professor of analytical chemistry in 1905; professor of chemistry and director of the chemical laboratories in 1914; and professor of chemistry and metallurgy and director of the chemical laboratory in 1920. He served as consulting chemist for the ordance department at large during the war. Dr. Campbell's blindness resulted from a laboratory explosion while at the university in 1892 when studying gases obtained by dissolving steel in hydrochloric acid.

Dr. Campbell was an honorary member of the American Society for Steel Treating and a member of the American Chemical society; Iron and Steel institute; Faraday society; Washington Academy of Sciences; Michigan Academy of Sciences; Tau Beta Pi; Michigan State Gas association; Society of Detroit Chemists; Alpha Chi Sigma; Sigma Psi Phi Lambda Upsilon and contributed extensively to technical and scientific journals.

Obituary

Edward P. Selden, former president of the Erie City Iron Works, Erie, Pa., died at his home recently.

Silas J. Llewellyn, president of the Chicago Malleable Castings Co. and the Interstate Iron & Steel Co., both of Chicago, died at his home in Evanston, Ill., Sept. 3, following an illness of almost six months. For 46 years he had been identified with the iron and steel industry of the middle west. Mr. Llewellyn, who was 65 years old at the time of his death, was born in Wales. His parents moved to Milwaukee when he was 4 years old and his schooling was gained there. His entry into the industry was through the North Chicago Rolling Mill Co. plant at Milwaukee.

Emil F. Axner, for many years in charge of merchant pig iron sales of the Illinois Steel Co. and more recently head of the scrap department of Hickman, Williams & Co., Chicago, died at his home in Chicago, Sept. 4. He was 51 years old. When but a boy he entered the employ of the Forster-Waterbury Co., which built the two original Iroquois stacks at South Chicago. He was with the Illinois Steel Co. from 1909 to 1919, and before becoming connected with Hickman, Williams & Co. sold pig iron for the former Matthew-Addy Co. in Chicago. He was a member of the Chicago Foundrymen's club.

Buyers Await Equipment Show

September Sales Lower than in August as Foundrymen Delay Purchases Until After Seeing Equipment First Hand

SEPTEMBER failed to measure up to August in the volume of sales of foundry equipment, although the slackening in buying was not heavy. The month preceding the exhibition of equipment at the convention of the American Foundrymen's association, usually finds buyers hesitating slightly on closing on equipment, since they rather would wait and see the various types of equipment shown before making purchases. Manufacturers anticipate considerable interest in connection with the show, and feel that the remainder of the year will show continued improvement in buying in the equipment market.

Plant managers are working toward the installation of equipment to cut the labor costs in plants, this being especially true in handling equipment. One company making a general line of material handling equipment reports that 40 per cent of its business for the past six months has been for sand handling equipment, the greater portion of this material going to plants already built and in operation. Numerous new plants and plant additions are being reported throughout the country which should call for considerable equipment in the near future.

Builders Anticipate Improved Buying

DEMAND for molding machines is the outstanding feature of the foundry equipment market in the general eastern territory. Good orders have been placed during the past couple of weeks and new orders under negotiation or in a tentative stage indicate that business in molding machines will continue fair for a period ahead. Business in flasks is fair but is not as large as in August. The call for foundry supplies has improved substantially, indicating increased operations at a number of plants. Pneumatic equipment enjoys a fair volume with no marked tendency toward improvement. Some sandblast equipment has been purchased and some repair orders have been placed, but conditions in this line are comparatively quiet. Demand for cupolas is small. Sand cutting and mixing machinery is not featured by much business. Export orders included some tumbling barrels for Japan and a cupola for Mexico. While no new business is reported in electric furnaces, some new inquiries have come out from foundries which may add such units in the near future. The W. F. Vilas Co., Ltd., Cowansville, Que., Canada, has purchased sandblast and dust arrester equipment from the Pangborn Corp., Hagerstown, Md., and the Boynton Furnace Co., Boynton, N. J., has secured shakeout bails from the Stoney Foundry Engineering & Equipment Co., Cleveland. The Republic Boiler & Radiator Co., Baltimore, has ordered tumbling mill equipment, and the Globe Malleable Iron & Steel Co., Syracuse, N. Y., and the General Electric Co., Schenectady, N. Y., large tilted sandblast mills of the positive pressure type from the W. W. Sly Mfg. Co., Cleveland. The Chrome Steel Works, Carteret, N. J., has bought a sand mixer from the National Engineering Co., Chicago.

Buying Falls in Pittsburgh

MANY of the foundry equipment inquiries pending in the Pittsburgh area are holdovers from last month, and action on some probably will be postponed until after the American Foundrymen's association meeting, since shop superintendents will not put through their requisitions or recommendations until after they attend the equipment show at Syracuse to look over the exhibits. This is particularly true in connection with molding machines, action on numerous inquiries pending for some time still being deferred. As a result, September did not prove to be as good a selling month as was August. A. Weiskittel & Son Co., Baltimore, has taken two large machines for bathtub production; and the Eagan-Johnson Steel & Iron Co., Crum Lynne, Pa., five machines from the Herman Pneumatic Machine Co., Zelienople, Pa. The Iron City Sanitary Mfg. Co., Zelienople, Pa., is closing on its two cupolas, two blowers, several cranes, as well as other equipment, and the National Roll & Foundry Co., Avonmore, Pa., likewise is in the market for a cupola. Two or three foundries here are in the market for sand mixers, the Franklin Foundry Co., Franklin, Pa., having taken a mixer from the J. S. McCormick Co., Pittsburgh. This dealer likewise sold a brass tilting furnace to the Louisville Brass & Steel Foundry Corp., Louisville, O., and has inquiries pending for three other tilting furnaces from foundries in Pittsburgh or vicinity. Two or three other inquiries are out for portable or tilting furnaces, and inquiries for general installations of foundry equipment are numerous, although two core ovens are up for attention before the trade. The Sheldon Spring & Axle Co., Wilkesbarre, Pa., has secured sandblast equipment from the Pangborn Corp., Hagerstown, Md. The Ajax Iron Works, Corry, Pa., and the Richmond Radiator Co., Uniontown, Pa., have purchased vibrator and shakeout equipment from the Stoney Foundry Engineering & Equipment Co., Cleveland. The Valley Mold & Iron Corp., Sharpsville, Pa., which is building a branch plant in South Chicago, Ill., is understood to be ready to negotiate for equipment from Sharpsville. The Vulcan Mould & Foundry Co., Latrobe, Pa., has been a recent purchaser of foundry equipment, including a sand mixer from the National Engineering Co., Chicago, and the Ajax Iron Works, Corry, Pa., is still negotiating for a crane and runway. The largest order for cranes placed by a foundry recently involved four or five for the Youngstown Foundry & Machine Co., Youngstown, O., awarded the Shaw Electric Crane

Works, Muskegon, Mich. Small supplies have moved freely for the past month or so in the Pittsburgh market.

Cleveland Buyers Wait

A SLIGHT lull in the buying of foundry equipment has been noted in the Cleveland territory during the past two weeks, a condition which manufacturers feel is only temporary. As in previous years, buyers are holding off placing orders until after the annual exhibition held at Syracuse, N. Y., in connection with the convention of the American Foundrymen's association, with the idea of seeing the various types of equipment before placing orders. Men of the trade believe that considerable buying will develop during the remainder of the year. The Agricola Furnace Co., Gadsden, Ala., has purchased two large sandblast rooms with necessary dust arrester and auxiliary equipment from the W. W. Sly Mfg. Co., Cleveland, and the Westinghouse Electric & Mfg. Co., Cleveland, has secured a complete sandblast room installation from the same manufacturer. The Continental Gin Co., Birmingham, Ala., has ordered shakeout bails from the Stoney Foundry Engineering & Equipment Co., Cleveland, and the American Radiator Co., Detroit, has secured sand mixers from the National Engineering Co., Chicago.

Several makers of equipment have been enjoying a good business in repair work. A number of construction enterprises are appearing in this territory. The Johnston & Jennings Co., Cleveland, has secured land and will erect a foundry at Detroit, which is expected to be in operation in November. The Hydraulic Press Mfg. Co., Mt. Gilead, O., recently has rebuilt its foundry and the W. S. Tyler Co., Cleveland, is making changes and additions to its foundry. The board of education, Cleveland, will buy some foundry equipment, including a tumbling and sandblast barrel, tilting brass and aluminum furnace gas fired, small core oven, jolt squeezer machine with vibrator, electric riddle, 2-wheel electric grinder, cupola ladle, 36 snap flasks, etc.

Western Sales Heavier

FOUNDRY equipment manufacturers in the Chicago district found September a much better month than August from the standpoint of business closed. In many instances orders resulted from immediate requirements rather than from longstanding inquiry. The Mt. Vernon Car & Mfg. Co., Mt. Vernon, Ill., is placing equipment for its new foundry and has purchased among other items, a sand mixer from the National Engineering Co., Chicago. The Lakey Foundry & Machine Co., Muskegon, Mich., has purchased shakeout bails from the Stoney Foundry Engineering & Equipment Co., Cleveland, while the Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., and the Standard Foundry Co., Racine, Wis., have ordered vibrator and shakeout equipment from the same manufacturer. The Buick Motor Co., Flint, Mich., has contracted for tumbling mill equipment from the W. W. Sly Mfg. Co., Cleveland, while the Oakland Foundry Co., Belleville, Ill., has purchased a sand blast room installation from the same manufacturer. The George Cutter Co., South Bend, Ind., has taken sandblast equipment and the Fuller & Sons Mfg. Co., Kalamazoo, Mich., has ordered dust arrester equipment from the Pangborn Corp., Hagerstown, Md. The Commonwealth Steel Co., St. Louis, has purchased a molding machine from the Herman Pneumatic Machine Co., Zelienople, Pa. The Kokomo Brass Co., Kokomo, Ind., is building an addition to its brass foundry.

New England Demand Improves

THE demand for foundry equipment in New England has improved gradually during the past week or 10 days. A sale of 14 molding machines in the district is reported by one manufacturer. The Whitman National Foundry Co., Whitman, Mass., bought a 26-inch forced draft brass furnace and some other equipment. Inquiry includes sand blast equipment wanted by a Connecticut foundry, a 5-ton traveling crane by a Boston district manufacturer, and numerous molding machines. The rate of melt in the district has increased and foundry supply sales are reported heavier than at any time in several months. It is reported that the S. M. Howes Co., Boston, is building a new stove foundry.

What the Foundries Are Doing

Activities of the Gray Iron, Malleable, Steel and Brass Shops

Marrin Foundry Co., 416 Lincoln street NE, Minneapolis, Minn., is building a 1-story, 40 x 85 foot reinforced concrete foundry.

Flint Brass Works, Flint, Mich., S. A. and G. J. Gutman, owners, will build an addition to enlarge its capacity.

Detroit Stoker Co., Detroit, will build a plant at Monroe, Mich., including pattern storage 60 x 80 feet and foundry 150 x 160 feet.

Kokomo Brass Co., Kokomo, Ind., will build a 1-story addition 50 x 132 feet. E. L. Danner has the general contract.

Keubler Foundries Inc., Easton, Pa., is installing a pulverized fuel system and making other improvements in its plant.

Rebuilding has been started on the plant of the Vulcan Iron Works, Wilkes-Barre, Pa., recently damaged by fire. (Noted Sept. 15.)

B. Wise, Inc., Mill and Moulton streets, Watertown, N. Y., L. B. Mitchell president, will rebuild the burned portion of its plant.

Romeo Foundry & Machine Co., Romeo, Mich., has been incorporated with $75,000 capital and 2500 shares no par value by H. D. Rumsey, C. E. Brinker and G. M. Sparks.

Topton Foundry Co., Kutztown, Pa., recently bought by the Klein Stove Co., Philadelphia, is building an addition 120 x 150 feet for use as a foundry.

Electric Steel Foundry, Portland, Ore., has been incorporated with $150,000 capital to conduct a foundry by Leonard Schad, G. W. Schad and George F. Schott.

Southern Engine & Boiler Co., Jackson, Tenn., Hubert C. Edwards general manager, recently reorganized, is having plans made for extensions to provide for enlarging its line

Union Iron Works, Los Angeles, has been awarded contract for steel building 60 x 80 feet for the Capitol Foundry Co., Phoenix, Ariz., E. C. Voss president. Equipment will include 80-foot crane runway and 2-ton crane. Foundry will specialize on mine and mill castings and general jobbing.

American Brass Co., Waterbury, Conn., has awarded a contract to the Immick Co., Meriden, Conn., for a 1-story addition for use as a casting shop and foundry.

National Radiator Co., New Castle, Pa., has awarded a contract to Smith & Bauman, New Castle, for a boiler shop and foundry addition.

American Die Casting & Stamping Corp., Kansas City, Mo., has been incorporated with $25,000 capital by Sidney C. Walker, 6426 Jefferson street, and others.

J. G. Speidel Foundry Co., Hamburg, Pa., has started construction of a 1-story foundry 80 x 90 feet, a core oven department 20 x 30 feet and a sand house and other buildings.

Peerless Foundry Co. Valley and Ludlow avenue, Indianapolis, Ind., C. W. Sparks secretary, manufacturer of gray iron castings,

will rebuild immediately the burned portion of its plant.

Riverside Foundry Corp., Buffalo, N. Y., has been incorporated with $40,000 capital to operate a foundry by G. Rykert, C. L. Rykert and F. W. Choate. R. L. Wells, Buffalo, is attorney.

Allmetals Foundries Inc., 4029 West Kinzie street, Chicago, recently organized to manufacture brass, bronze and aluminum castings, has established its plant and is in full production.

Industrial Foundries, Hilton, N. J., has been incorporated with 1000 shares no par value to operate foundries by Lee L. Linehan, Frank J. Linehan and James A. McCarthy. L. L. Linehan, Hilton, is attorney.

Property has been acquired at Roosevelt boulevard and Palethrop street, Philadelphia by the Haines, Jones & Cadbury Co., 1136 Ridge avenue, for the erection of a new plant for the manufacture of plumbers' brass goods.

John F. Panyard Co., Detroit, has been incorporated to operate a foundry for the production of pistons and piston rings, with $50,000 capital by Minnie B. Panyard, Melvana Clark and John F. Panyard, 1238 Calvary avenue, Detroit.

A $500,000 branch plant will be erected at Newark, N. J. by the Standard Sanitary Mfg. Co., Pittsburgh. According to plans by Walter S. Timmis, 315 Fifth avenue, New York, architect, the proposed structure will be four stories high, 95 x 372 feet.

Columbia Refrigerator Co., manufacturer of refrigerating machinery with main offices at San Francisco, is completing a new plant at Lankershim, Calif., including machine shops, foundry, pattern shop, core and assembly rooms. Howard Seely is president.

Rosenbaum Mfg. Co., New York, has been incorporated with 100 shares of common stock no par value to operate a foundry by L. Rosenbaum, M. Rosenbaum and H. Rosenbaum. Manheim & Wachtel, 1328 Broadway are attorneys.

Central Foundry Co., New York, manufacturer of cast iron pipe, has closed its several foundries in New York state, to devote its efforts to those in the South. The plant at Medina, N. Y., has just been abandoned. The Medina plant was started in 1878 by Albert Swett with a small foundry, which was enlarged almost to present size in 1880. In 1898 the A. L. Swett Co. was bought by the Central Foundry Co., Mr. Swett retiring from active business. Soil pipe and fittings were made the principal output of the Medina plant. Plans are on foot by Medina business men to acquire the plant and continue production of pipe.

New Trade Publications

CAR TORCHES—Johnston Mfg. Co., Minneapolis, is distributing a bulletin describing their high lift vacuum torch for use in car work.

CHARGING HOISTS—What the company's hoist will do for you is the subject of a pamphlet published by P. H. & F. M. Roots Co., Connersville, Ind. It gives various uses of their cupola charging hoist.

LEVEL AND PRESSURE INDICATORS—Republic Flow Meters Co., Chicago, has issued a pamphlet describing electrical level and pressure indicators and recorders which can be used for long distance supervision. The instruments may be used either on gas, water or other fluids.

ENAMELING—Anything that pertains to the enameling industry, from a complete enameling plant to a pair of asbestos gloves can be found in the 72-page catalog distributed by Ferro Enamel Supply Co., Cleveland. The catalog also contains useful data on the process of enameling.

GRINDERS—Norton Co., Worcester, Mass., has issued a booklet on grinding wheel stands and accessories. The descriptions of motor driven and belt driven stands are given with tables of the various sizes manufactured. The publication also includes protection and dust hoods.

POWER FACTOR CORRECTION—Hermetically sealed units that are connected into the power line to correct the power factor and give more efficient operation are described in the General Electric Co., Schenectady, N. Y. 24-page catalog. Charts and tables are given for determining sizes required.

INDUSTRIAL TRUCKS—Crescent Truck Co., Lebanon, Pa., has issued a catalog showing its line of industrial trucks and tractors for a widely diversified list of uses in plants. Mechanical features of its construction are shown by text and illustration and halftones of various types of trucks with engineering data are given.

TRACTORS—Pulling almost anything from a railroad car in a switchyard to a load of logs in the north woods seems the forte of the caterpillar tractor featured by the J. T. Tractor Co., Cleveland, in a bulletin now being distributed. Varied uses are shown in halftones and full specifications of the machine are given in the text.

BLOWERS—P. H. & F. M. Roots Co., Connersville, Ind., has issued a 15-page bulletin describing low pressure rotary blowers. The history and operating principle of this type of blower are given. Several tables giving sizes and capacities are contained in the bulletin.

AIR COMPRESSORS—Stationary and portable air compressor equipment is described in a 16-page folder of the Allis-Chalmers Mfg. Co., Milwaukee. A general description of air compressors, including direct and alternating current types is included, while the major features of the machines are described and illustrated.

MOLDING MACHINES—The Osborn Mfg. Co., Cleveland, has published two pamphlets, the first describing its line of jolt squeezer molding machines which are air operated, and the second outlining the standard procedure in making a mold on this type jolt squeezer molding machine. Both publications are well illustrated.

JUNCTION BOXES—The Crouse-Hinds Co., Syracuse, N. Y., has published several bulletins describing a variety of junction boxes for use in electrical work. The boxes are made of cast iron, the covers being made of cast brass and threaded. Two bosses on the cover permit the use of a wrench or screw driver in turning it. Dimensions are given.

METALS UNDER TEMPERATURE—Pioneering in Science is the title of a new 184-page book issued by Crane Co., Chicago. It is a resume of the tests that control the quality of their products with special reference to the effect of temperature on metals. The book also contains a symposium, "The Effect of Temperature upon Properties of Metals." It is a valuable addition to the library of those who use metal fittings undergoing high temperatures, and is well illustrated and contains many tables.

CUTTING AND WELDING APPARATUS—Equipment used in cutting and welding, including torches and outfits, regulators, acetylene generators, portable trucks, adaptors, manifolds, oil preheaters, carbide lights, welding rods and flux, are described and illustrated in a recent publication of the Alexander Milburn Co., Baltimore.

SWITCHBOARDS—Installation, operation and maintenance of switchboards are discussed in a new 120-page booklet recently issued by the General Electric Co., Schenectady, N. Y. The booklet is profusely illustrated with photographs, diagrams, tables and formulas. It contains much varied information of value to those installing and operating switchboards.

FURNACES—Reversing and control of regenerative furnaces are described in a catalog by the Morgan Construction Co., Worcester, Mass. By this system it is claimed the operator has better control of his furnaces and various benefits accrue from its use, such as increased tonnage, longer life of walls and other economies.

TRACTORS—Caterpillar Tractor Co., San Leandro, Calif., is sending out a bulletin reprinted from a coast banking paper under the caption "Girdling the Globe with Tractors," which presents the facts of the formation of this company from the C. L. Best Tractor Co. and the Holt Mfg. Co. A broadside accompanying it gives data on various types of tractors produced by the company.

ENDLESS BELTS—L. H. Gilmer Co., Philadelphia, manufacturer of endless belts, has issued a booklet on that subject, giving engineering data on small belt drives, discussion of belt speeds, ratio of pulley diameter to belt thickness, pulley flanges and other details. This fills a need in providing information on small belts which has not been treated in works on belts in general.

CONVEYORS AND CONVEYOR SCALES—Stearns Conveyor Co., Cleveland, has issued two bulletins describing conveying equipment in detail and scales to weigh materials as they are conveyed. The latter is accomplished electrically, the forward and return sides of the conveyor being balanced against each other on the scale beam, the conveyed material thus being accurately determined.

SCREENS—The Allis-Chalmers Mfg. Co., Milwaukee, has issued a pamphlet describing an iron frame revolving screen for foundry use. Refuse from the cleaning floor is dumped into the screen hopper, the sand dropping through the perforations while the pieces of broken core and pieces of metal are delivered to a spout at the lower end of the screen.

STEAM SEPARATOR—An interesting development of a steam separator is described in an information leaflet published by the Griscom-Russell Co., 90 West street, New York. This device, which is used on high pressure steam lines, has been changed in design by the addition of larger helical path and a spatter cap on the outlet pipe to increase the separating efficiency.

AIR AND GAS SCRUBBER—A device for cleaning air and gas in industrial processes is described in a booklet which recently has been published by the D. J. Murray Mfg. Co., Wausau, Wis. The construction of the various parts of the machine is given, as well as the principle of operation and some of the industries to which the device may be applied. Among the latter, the cleaning department of foundries is included.